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SALIENT ITEMS, Vol. 28, No. 3.

ENVIRONMENT

The world's climates:—Details of temperatures, relative humidities and rainfalls are available for 2,000 places in the world in tables published by the Meteorological Office in London (3189).

Plant micro-climates:—In a strawberry field (2257), inside the crown of an apple tree (2151) and within a single cup-shaped flower (2065).

Soils and soil substitutes:—If soil pores are too small or too rigid in structure root penetration is impeded (2131). On the subject of soil substitutes there is a whole book describing the growing of crops in vermiculite (3179) and papers which advocate the use of ground pumice stone as a medium for cucumbers (2569) and glass wool as a substrate in boron deficiency studies (2128). "Fly ash" contains toxic substances, including excess boron, but can be used to grow certain tolerant vegetables (2529).

Soil amendment:—Interest in soil conditioners, though subdued, is not quite dead (2279, 2528, 2921). Plants themselves may do a good deal of amending, as witness the effect of stocks in reducing the soil pH within their rhizosphere (2886).

Temperature:—Studies on the effects of winter chilling on growth and flower initiation are reported for strawberries and olives (2256, 3013). The effect of chilling in inducing flower formation in onion setts can be reversed if the setts are subsequently allowed to sprout in warmer conditions (2617). In the trifoliate orange, flower sex, and in a yellow rose, flower colour, may be upset by cold weather (2975, 2920). In coffee night temperature is a major factor influencing growth, but there is a time-lag of 3–4 weeks before the response becomes apparent (3073). In apples variations in temperature are a major cause of fluctuation in shoot growth (2173), and when the variation takes the form of an abrupt fall caused by high winds leaf growth also may be affected (2326). In carnations low temperatures encourage calyx splitting, especially when combined with high light intensities (2866, 2867). In lilies, on the other hand, flower numbers and quality are upset by high temperatures combined with low light intensities (2900).

Photoperiods:—Why are some plants adapted to growing in short days and others in long days? It is suggested that in some cases the annual rainfall distribution in the country of origin may be a decisive factor (2064). The winter hardiness of shrubs is shown to be influenced by the day length under which they are grown prior to the onset of winter (2927). In studies on the mechanism of the photoperiodic response increasing attention is being paid to the intricacies of red and far-red illumination (2872–2874, 2928).

GROWTH PHENOMENA

Juvenility:—To keep olive trees juvenile indefinitely all you need is a flock of goats to provide continuous pruning (3012). To restore mature ivy to the juvenile stage all you need is some gibberellin (2938). To distinguish shoots of different physiological age in citrus all you need is a working knowledge of scientific Russian (2970). A case of reversion to juvenility is reported in an old pear variety (2181). If you still want more information on this subject, please read the notes below on propagating cuttings.

Growth and vigour:—Statistical aspects of measuring the shoot growth and leaf areas of apples are examined in 2 papers (2153, 2154). With radishes root length is directly related to hypocotyl length and both are influenced by cultural methods (2632). When diploid and tetraploid tobacco plants are interplanted the former may gain, and the latter lose, in vigour (2724). Several plants grow more vigorously when placed in electrostatic fields (2118).

Flower and fruit development:—The oil palm shows a tendency towards triennial bearing (3099). Coffee flower buds, when mature, may become dormant through water stress (3074). The growth of orange fruits occurs in 3 stages, and, as in apples, almost all cell division is completed in the first stage (2974).

Ovule culture:—Successful with excised ovules of candytuft and poppy (2112, 2113).

Growth substances:—There is a handbook on "test methods with plant-regulating chemicals" (2085). Two chlorobenzoic acids are now among the chemicals which can pass out of the roots of one plant and into those of another (2092). A quaternary ammonium compound, Amo-1618, seems to possess interesting possibilities as a growth retarder or "plant tranquillizer" (2877). For those in search of more solid reading matter there is an account of studies on the growth substances present in black currant berries following both self- and cross-pollination (2243).

The other growth substance:—The time is fast approaching when we shall have to consider devoting the whole of Salient Items to the gibberellins. At present, however, we do not wish to risk annoying the half dozen or so old-fashioned readers who are not yet working actively with these fascinating compounds. Herewith, then, is merely another list of numbers, with the proviso that, as in the bran tub at the fair, there is something for almost everyone in it (2074, 2088, 2097–2111, 2290, 2291, 2520–2524, 2574, 2592, 2647–2649, 2677, 2678, 2850–2854, 2859, 2862, 2875, 2876, 2885, 2915–2917, 2938, 2972, 2973, 3137).

MACHINES AND METHODS

General:—A book on horticultural engineering is briefly reviewed in 3180.

Machines:—Among new models are machines for the subsurface application of insecticides and chloropicrin (2139, 2709), a precision seed drill for turnips (2637), a machine for laying polythene mulch (2138), a weed cutter for use in oil palm plantations (2481) and an ambitious grape harvester (2296). Economic aspects of mechanization are considered with regard to the transplanting of carrots for seed production (2627) the shelling of beans for freezing (2599) and the bulk handling of citrus (2993).

Apparatus and techniques:—These include electronic leaves for mist propagation (2142), a device for sowing seeds uniformly in seed boxes (2140), a light trap for insects (2404), the use of a wind tunnel to study the delivery patterns of spray nozzles (2453), and new methods for staining pollen tubes (2144) and for detecting damage in citrus fruits (2996).

Heat and light:—Soil can be warmed out of doors by steam passed through tile drains (2515). Two new lamps with reflectors are compared (2513), and methods of measuring light in glasshouses are described (2135).

Storing fruit and vegetables:—Slowing down ripening by pre-cooling is the subject of 3 papers (2225, 2241, 2250) and speeding up ripening that of a fourth (2222). Cathode rays can be used to control brown rot of peaches (2370) and X-rays to detect frost damage in citrus fruits (2978). The highest temperatures at which the tissues of various fruits and vegetables freeze are also recorded (2946).

Drying crops:—A new pyrethrum drier is described (2818), as are investigations on the drying of hops (2816), canaigré roots (2835) and coffee (3087).

NUTRITION

Absorption and translocation:—Among numerous papers on this subject is one describing how the roots of tomato plants absorbed much more P following the application of urea to the leaves (2686). The translocation of P is affected by various factors, among them the application of insecticidal oils (2967) and, in the case of foliar applications, the rate of drying of the solution on the leaf (2123). A herbicidal oil is also mentioned as one of several factors that affected the uptake of Fe and Zn by avocado and orange trees (2950). Other studies describe the Cu nutrition of hevea (3113), the effect of heavy metals on Zn absorption by coffee (3076) and the movement within plants of radioactive Cl and Ca (2067, 2526).

Deficiencies:—Deficiency symptoms are described for tobacco and carnations (2731, 2864), and a case of severe Fe deficiency in tobacco is mentioned, in which the roots excreted large amounts of a yellow pigment resembling riboflavin (2755). With radishes susceptibility to wilting in dry weather appears to be enhanced by the deficiency of any one of several trace elements (2633).

Plant analysis:—In oil palms successive leaves tend to show gradients in the content of minerals (3100). In apple leaves concentrations of nutrient elements may vary considerably within periods as short as a fortnight (2197, 2199). The so-called crop-logging system applied to sugar cane has been modified to give more accurate indications of the status of P and Ca within the plant (3135).

Oddments:—In ripe tomato fruits radial cracking is sometimes negatively correlated with Ca content and positively correlated with K content (2693). In hemp male and female plants like their dose of K at different stages of growth (2803).

PLANT PROTECTION

Fungi and bacteria:—Figures on the economic aspects of scab losses and control in Nova Scotian apple orchards may be of interest (2358), as may the information that captan applied to control scab in Italy may advance fruit maturity by as much as 20 to 30 days (2437). Another crop in which the possible side-effects of fungicides need consideration is hevea (3118). Indirect methods of controlling diseases include an unexplained effect of alfalfa meal in checking root rot of avocado trees (2952) and the use of zinc frit to control turnip mildew (2639). Among new fungicides Cyprex is prominent (2353–2355, 2373, 2379) and the systemic compound pyridine-2-thiol-N-oxide shows promise (2593, 2594). Among antibiotics streptothricin and pleocidin are systemic and move upwards as well as downwards (2531).

Viruses:—"Virus-free" strawberry clones usually, but not invariably, yield better than commercial clones (2336, 2337). The news that apple mosaic may be spread by natural root grafting in the nursery does not make life any simpler (2331).

Insects and mites:—Some fungicides encourage orchard mites but others exert a considerable measure of control (2395). Fortunately, the tendency of mites to develop parathion-resistant strains no longer seems to be restricted to harmful species (2394). A critical review of the techniques used for testing insecticides also considers the problems posed by the emergence of resistant strains (3181).

Nematodes:—Among control measures described are the use of electric soil heating (2393), the modification of environment for glasshouse tomato crops (2706), a new nematocide with low phytotoxicity (2532) and the use of vermiculite as a carrier for soil fumigants (2533).

Birds:—On the credit side there are woodpeckers, both eastern hairy and northern downy, which help to control codling moth in Nova Scotia (2421). On the debit side there are pigeons, which, however, can be discouraged by strategically placed wires (2535), and a Siberian partridge which apparently has taken to eating fruit buds (2435). On the debit side, too, is the slaughter, presumably indiscriminate, of birds by some of the modern insecticides (2436).

PROPAGATION

Seed germination:—Two papers confirm that the seeds of many plants show seasonal fluctuations in germination capacity (2727, 2845). In the writer's admittedly limited experience lettuce seeds germinate with speed and precision, but, as no less than 13 papers are devoted to this subject (2646, 2647, 2649–2660) presumably other people are less fortunate or perhaps more inquisitive. Among other papers there is one which provides evidence that broad bean seeds become sensitive to light within a few hours of imbibing water (2584) and another which describes in detail the biochemical changes that occur in tung seeds during germination (3024).

Seed treatments:—Five papers, all from Russia, claim all sorts of benefits from soaking seeds in nicotinic acid (2525), fumigating them with carbon monoxide (2570), giving them electric shocks (2571), bombarding them with X-rays (2631) and soaking them in hypocotyl sap (2729). Elsewhere, however, seeds are reported to dislike ultrasonic noises (2517) and aqueous extracts of mushrooms (2602).

Cuttings:—The importance of the juvenility problem is emphasized in papers on the rooting of cuttings of apples (2163), cinchona (2791) and hevea (3112), and the last of these describes a novel method of making an old clone produce cuttings which will root. With vines complete nutrition of the parent plants may improve the rooting of cuttings by increasing their contents of starch, tryptophan and auxin (2274). Other papers describe the behaviour of dogwood cuttings taken at monthly intervals throughout the year (2933), the effects of different rooting media and root aeration on various cuttings (2921, 2934, 3154), the rooting of blueberry and cacao cuttings under plastic covers or in plastic bags or pots (2247, 3043–3045), the effects of bottom heat on the rooting of several ornamentals (2849), and a method of raising strawberries from crown cuttings (2255).

Grafting:—Short lengths of polythene tubing can be used to keep herbaceous grafts rigid (2846). With strawberries terminal leaflet grafts have been used in virus transmission tests, but, although virologists agree on the success of the grafts, they disagree on the success of the transmission (2335). If, for some unaccountable reason, you feel impelled to graft maize onto squash do not claim that a satisfactory union has been formed before making sure that the scion has not pushed roots clean through the stock and into the ground (2669).

Stock-scion relationships:—In apples a comparison of the top and root growth of unworked rootstocks may throw light on the mechanism of rootstock effect (2174). In holly there is some evidence that chromosome size plays a part in incompatibility as well as in the vigour of compatible combinations (2937).

MISCELLANEOUS

Agrotype concept:—As applied to tea (3149, 3150).

Anniversary:—Vineland, Ontario, the first 50 years (3192).

Colour chart:—In the form of a fan (2060).

Cut flowers:—To make them last longer consult 2859 and 2860. To stop snapdragons bending try naphthylphthalamate (2885).

Damaged trees:—Wrapping girdled stems in polythene an aid to recovery (2143).

Economics:—More about the glasshouse industry in England (2136, 2137).

Flavour:—An attempt to define chocolate flavour in chemical terms (3061).

Patience:—Counting the number of grass shoots in lawns (2906).

Pollen inserts:—Useful, but not with lycopodium as a diluent (2185, 2186).

Sex:—It may be of some comfort to report that sex differences in ginkgos and papaws can be resolved without the aid of psychiatry (2936, 3101).

MISCELLANEOUS.

General.

(*See also* 3179, 3189, 3191, 3203, 3208, 3210, 3214, 3220, 3225, 3226b, c, f-h, k, n.)

2059. McFarlane, N. L., Ayers, R. S., and Winright, G. L.
California desert agriculture.
Circ. Calif. agric. Exp. Stat. **464**, 1957, pp. 66, illus.

This circular describes the special problems of desert agriculture, particularly excessive salinity, and the techniques which solve them. The cultural needs of the crops which can be grown under desert conditions are described, including the growing of winter vegetables, grapes, dates, figs and citrus fruits.

2060. Wyman, D.
The new horticultural color chart.
Arnoldia, 1957, **17**: 57-60, illus.
A new color chart for horticulture.
Nat. hort. Mag., 1958, **37**: 47-9, illus.

The "Nickerson Color Fan", published by the Munsell Color Company contains 262 colour samples arranged in the form of a fan. The Munsell system of organizing colours numerically is fast becoming the standard used in many phases of industry and science in the U.S.A. Conversion tables have been made for the Ridgway chart and the Royal Horticultural Society chart, so that record notes made from them can be readily transferred to the Munsell colour notations. The Nickerson Color Fan, which fits easily into a pocket, can be obtained from the American Horticultural Council, Arnold Arboretum, Jamaica Plain 30, Mass., at $5.00 [post free within the U.S.A.]. [For Wanscher's Colour Chart see *H.A.*, 27: 1006.]

2061. Hodges, D.
A calendar of bee plants.
Bee World, 1958, **39**: 63-70, bibl. 8.

The dates on which the first flower opened were recorded over a 17-year period for individual trees or plots of plants growing at Ashtead, Surrey. The 8 plants concerned were crocus, myrobalan, Early River's plum, Clapp's Favourite pear, Beauty of Bath apple, horse chestnut, raspberry and lime. The records show that, except for the lime tree, all the plants varied by at least 1 month between the earliest and latest dates on which flowering started, and that it is impossible to forecast the flowering date of any one species from the flowering date of an earlier species. In addition, a bee calendar is provided showing the approximate flowering periods of 105 honey and pollen plants, which include fruits, nuts, and ornamental and wild flowers.

Statistics and experimentation.

(*See also* 2147i, 2152-2154, 3226d.)

2062. Bross, I. D. J.
How to use ridit analysis.
Biometrics, 1958, **14**(1): 18-37, bibl. 7.

This paper gives a simple non-technical explanation of the use of ridit analysis, a method of transforming variables which cannot be measured on a precise scale into figures capable of computation and analysis. It is of value when observations are in a subjective scale such as "minor", "moderate", "severe", etc., and would clearly be of value in horticultural research.

Climate, microclimate and air pollution.

(*See also* 2318-2328.)

2063. Brazell, J. H., and Taylor, C. M.
Artificial stimulation of rainfall in East Africa by means of rockets.
Nature, 1958, **181**: 1421, bibl. 4.

From the latest series of experiments, carried out at Tabora, Tanganyika, the following conclusions were drawn: "The rocket technique is an accurate and efficient method of cloud-seeding and compares favourably with seeding by aircraft. It would appear that sodium chloride is an efficient seeding agent in East Africa and that clouds may be induced to rain earlier and more heavily than they would have done naturally. There is strong evidence that clouds which are unlikely to rain naturally can be induced to precipitate by seeding with sodium chloride." A full report will be published elsewhere.—East African met. Dep., Nairobi.

2064. Junges, W.
Die jährliche Niederschlagsverteilung als entscheidender Faktor bei der photoperiodischen Anpassung der Pflanzen. **(Annual rainfall distribution as a decisive factor in photoperiodic adaptation of plants.)**
Gartenbauwiss., 1957, **22**: 527-40, bibl. 17.

The type of photoperiodic reaction of several plants has been related to the annual distribution of rainfall in their country of origin. Plants from areas with dry winters were short-day plants. In areas with dry summers plants were markedly long-day, while those where winters were wet and cold were less definitely long-day plants. [See also *H.A.*, 27: 3815w.]

2065. Büdel, A.
Das Mikroklima in einer Blüte. **(The micro-climate in a flower.)**
Z. Bienenforsch., 1956, 3(8): 185-90, from abstr. in *Bee World*, 1958, Vol. **39**, p. 71.

Experiments made with cup-shaped flowers showed that the temperature at the level of the stamens was slightly higher than that of the outer air, even before the sun's rays touched the flower. In full sunshine it rose to 10° C. higher, falling almost to that of the outer air when the shadow of a tree was on the flower and rising again rapidly in returning sunshine; the air temperature changed very little. In overcast weather, wind and rain "destroyed" the micro-climate within the flower, but strong winds in sunny weather had scarcely any effect on it. At night, in normal conditions of radiation, the flower did not cool off more rapidly than the surrounding air.

2066. Hölte, W.
Zur Kenntnis von Wesen und Erscheinungsformen der Schwefligsäureeinwirkung auf die Pflanzenwelt. **(On the nature and symptoms of the action of sulphurous acid on plants.)** [English summary 5 lines.]
Z. PflKrankh., 1958, **65**: 32-6, bibl. 13.

The SO_2 in the air of industrial areas enters the plant through the stomata and affects physiological processes in general. It interferes with photosynthesis, metabolism and the water balance within the cells, inhibits the activity of iron in the chloroplasts and probably of vitamin B_1. The microscopical changes occurring in smoke-injured cells are described.

Biochemistry.

2067. Woolley, J. T., Broyer, T. C., and Johnson, G. V.
Movement of chlorine within plants.
Plant Physiol., 1958, **33**: 1-7, bibl. 14, illus.

Radiochloride was applied overnight to the leaves of tomato and sugar beet plants. The plants were harvested 1 and 8 days after termination of such application. Radioautographs showed that some of the applied radiochloride reached all parts of the plants. More radiochlorine had been translocated from the application site 8 days after application than had been translocated one day after application. Known amounts of radioactive chloride were supplied to the roots of tomato plants in culture solutions at two levels —a deficient level and an adequate level. Plants were harvested at different times and the plant parts were assayed for radiochlorine, such assays being expressed as percentages of the total applied labeled chloride and as concentrations in μg. atoms per gram dry weight of tissue. It was shown that some younger plant structures obtained radiochlorine at the expense of the older leaves. This demonstrated retranslocation of chlorine as defined. Retranslocation was from regions of high chlorine concentration to those of low concentration, and was concurrent with a decrease in chlorine concentration in all plant parts. [From authors' summary.]—Univ. Calif., Berkeley.

2068. Williams, W., and Dowrick, G. J.
The uptake and distribution of radioactive phosphorus (^{32}P) in relation to the mutation rate in plants.
J. hort. Sci., 1958, **33**: 80-95, bibl. 8, illus.

Solutions containing varying quantities of radioactive P were applied to apple and pear trees, and to plants of foxglove, sweet pea and tomato. Root uptake was too slow, but methods of injection which were more successful are described. The isotope was rapidly transported from the site of injection; in general final distribution was not affected by the position of entry. Meristematic regions showed rapid accumulation of P, and the efficiency of the dose was shown to be related to the number of active buds. Loss of activity in the meristem resulted from root exudation and from dilution due to growth. The upper levels of tolerance of vegetative buds of apple and floral buds of foxglove, calculated as total activity shortly after injection, were approximately 50 and 12 μc. per g. dry weight respectively.—John Innes hort. Instn, Bayfordbury.

2069. Molotkovskij, G. H., and others.
Distribution of radioactive phosphorus in some plants in connection with the phenomenon of polarity. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1958, **5**: 37-41, bibl. 21, illus.

The distribution of P^{32} applied as labelled Na_2HPO_4 was investigated in cineraria, in hydrangea the shoots of which were grown in normal, horizontal and inverted positions, and in potato and *Perilla ocymoides* which were grown under different daylengths after application. The P^{32} content increased in cineraria from the root neck to the top of the stem and tips of roots, in hydrangea from root neck to stem top, but in potato and perilla from the top to the root neck. The lowest leaves had the highest P^{32} content in cineraria and the lowest in potato and perilla. In the leaf blades of cineraria and hydrangea the increase was from the base to the tip. The distribution was found to be stepwise in the stem of the plants but with uniform gradient in the roots and leaves.

2070. Sondheimer, E.
On the distribution of caffeic acid and the chlorogenic acid isomers in plants.
Arch. Biochem. Biophys., 1958, **74**: 131-8, bibl. 10.

Results are given of examinations of coffee beans, blueberry leaves and fruit, apples, pears, grapes, peaches, prunes, plums and cherries using silicic acid column technique.

2071. MELCHIOR, G. H.
Über den Abbau von Indolderivaten. II. Mitteilung. Abbau durch ein Enzymsystem aus Weisskohl und ein Vergleich der Indolderivate in UV-bestrahlten und unbestrahlten Weisskohlpflanzen. **(On the breakdown of indole derivatives. II. Breakdown by an enzyme system of cabbage and a comparison between the indole derivatives in cabbage plants irradiated with ultra-violet light and untreated controls.)***
Planta, 1958, **50**: 557-75, bibl. 39, illus.

The paper deals with the breakdown of β-indoleacetic acid-oxidase prepared from cabbage plants. The effect of ultra-violet light on the natural indole derivatives varied with the age of the plants at the time of treatment.—Liebig Univ., Giessen.

2072. MEDVEDEV, Ž. A.
An autoradiographical investigation of S^{35} methionine adsorption by the leaf proteins of certain plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 860-3, bibl. 10, illus.

A study of the adsorption of labelled methionine by proteins of the leaves of *Phaseolus vulgaris*, *Sanguisorba canadensis*, *Tilia* sp. and *Aristolochia clematis* by the imprint method [see *H.A.*, 28: 1019].

2073. GOODWIN, T. W.
Studies in carotenogenesis. 24. The changes in carotenoid and chlorophyll pigments in the leaves of deciduous trees during autumn necrosis.
Biochem. J., 1958, **68**: 503-11, bibl. 32.

The changes in the constituent chlorophylls and carotenoids of the leaves of three trees [black plum (*Prunus nigra*), oak (*Quercus robur*) and sycamore (*Acer pseudoplatanus*)] have been followed from June to November. In *P. nigra* the anthocyanin was also examined. In both the oak and the sycamore the chlorophyll and carotenoid levels fell almost to zero, but whereas in the oak the levels fell simultaneously, in the sycamore the drop in chlorophylls preceded that in carotenoids. In the black plum the carotenoids tended to disappear first, but both carotenoid and chlorophyll levels fell only to about 50% of their starting values. In all cases β-carotene and neoxanthin disappear more rapidly than do the other carotenoids, and lutein 5:6-epoxide appears in small amounts. In the sycamore, but not in the other two trees, both lutein and violacanthin esters appear in relatively large amounts in the later stages. These esters exist mainly in the cytoplasm and not in the chloroplasts. In all cases the ratio chlorophyll *a:b* falls slightly during the late autumn. There was no loss of anthocyanin in *P. nigra* leaves. [Author's summary.]—Univ. Liverpool.

Physiology.

(*See also* 3197, 3198, 3205.)

2074. SARKAR, S.
Versuche zur Physiologie der Vernalisation. **(Experiments on the physiology of vernalization.)** [English summary 1¼ p.]
Biol. Zbl., 1958, **77**: 1-49, bibl. 84, illus.

1. Soaked seeds and very young seedlings of biennial *Hyoscyamus niger* are not vernalizable. Vernalizability starts in 10-day-old seedlings and rises rapidly up to the age of 30 days. No further increase in the effect of cold treatment could be observed in plants up to 110 days old. 2. The annual variety has no cold requirement. 3. The F_1 hybrids of the two varieties behave as "intermediate". 4. Vernalized biennial *Hyoscyamus niger* plants kept under short day conditions maintain for a long time their capacity to flower in long days. Some indications of a gradual weakening of the vernalized state were, however, obtained. 5(a). Gibberellic acid has a strong positive effect on the flowering of the facultative cold-requiring variety of *Arabidopsis thaliana*. Under natural day-light conditions of autumn a similar but weak action of β-indoleacetic acid and an inhibitory action of triiodobenzoic acid were observed. Under LD conditions the effect of GA is strong and that of IAA very weak, while a synergistic action of the two growth substances, though possible, could not be determined with certainty. 5(b). Seeds of the winter variety of *Arabidopsis thaliana* which can be vernalized by cold cannot be vernalized by GA at 20° C., nor does a GA-treatment definitely strengthen the effect produced by a cold treatment at +1° C. Young rosettes, which do not react well to a cold treatment, show an optimum reaction to GA. The vernalizability with cold is again high in older rosettes, whereas the action of GA falls with increasing age of the rosettes. 5(c). In the case of *Arabidopsis thaliana*, GA accelerates the formation of flower primordia before an elongation of the main axis takes place. In *Hyoscyamus*, on the other hand, the flower primordia are produced under the action of GA only after an abnormal elongation of the axis. In both plants, however, the number of leaves on the axis increases at the expense of rosette-leaves. In *Arabidopsis* the oldest internodes cannot be stretched by GA, while in *Hyoscyamus* even the second internode following upon the cotyledons can be stretched by GA, so that the formation of a rosette can be totally suppressed. 5(d). In conclusion, it is certain that GA does not directly affect the internal reactions which proceed during a cold-vernalization, and that it is not identical with "vernalin", the hypothetical end product of vernalization. The blockage which obviously stands in the way of the internal processes leading to flowering in cold-requiring plants is removed by GA through a mechanism different from that utilized by a low temperature. It is also remarkable that this other mechanism can be brought into play in the case of *Hyoscyamus* only after an almost abnormal stretching of the axis, whereas in *Arabidopsis* it occurs with a simultaneous stretching of the rosette. [From author's summary.]—Max-Planck Inst. Biol., Tübingen.

2075. NEZGOVOROV, L. A.
The after-effect of low positive temperatures on the photosynthesis of heat loving plants. [Russian.]
Fiziol. Rast., 1956, **3**: 527-33, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 89,909.

Young cucumber plants were kept in the dark at 3–5° C. for from 15 hrs to 8 days, and the photosynthetic activity of their leaves was determined 1–2 hrs after transferring into a moist chamber at room temperature.

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* For part I see *ibidem*, 1957, **50**: 262–90

Cold treatment for 15–64 hrs depressed photosynthesis, especially in the younger leaves. Treatments for longer periods resulted in considerable or even complete loss of photosynthetic ability and caused serious leaf injury or death of the plants.

2076. Petinov, N. S., and Molotkovskij, Ju. G.
The physiological nature of heat resistance in some cultivated plants. [Russian.]
Fiziol. Rast., 1956, **3**: 516-26, bibl. 30, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 89,910.

Studies were conducted on the effect of short term treatment at 40–48° C. on respiration, dehydrase activity, and organic acid and ammonia contents of the heat-resistant plants watermelon and millet and heat-susceptible plants lettuce and oat. High temperatures caused a sharp decline in respiratory activity, especially with susceptible plants. The protective reaction of resistant plants appears to be the reduction of the respiratory coefficient accompanied by the accumulation of organic acids, which in turn is connected with an increase in dehydrase activity. The protective role of organic acids consists in fixing the final product of proteolysis, i.e. ammonia, formed during high temperatures. Heat resistance was increased by treatment with weak solutions of citric acid or spraying with Zn, accelerating the accumulation of organic acids.

2077. Zeevaart, J. A. D.
Studies on flowering by means of grafting. III. Translocation of the floral stimulus through a day-neutral interstock.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1957, **60**: 523-30, bibl. 9, illus.

Under long-day conditions both stocks and scions of the long-day *Nicotiana sylvestris* induced flowering in the short-day Maryland Mammoth. Neither stocks nor scions of the day-neutral variety Delcrest were able to induce Maryland Mammoth receptors. When a leafless Delcrest interstock was used between a *Nicotiana sylvestris* donor and a Maryland Mammoth receptor flower buds were formed on the receptor, but flower formation was inhibited by a leafy interstock. Interstock leaves did not affect the downward movement of the floral stimulus.—Lab. Tuinbouwpl., Wageningen. [For parts I and II, see *H.A.*, 28: 17 and 18.]

2078. Zeevaart, J. A. D.
Studies on flowering by means of grafting. IV. Flowering of two long-day *Sedum* species in short day on induced *Kalanchoë* stocks.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1957, **60**, 630-9, bibl. 13, illus.

The long-day plants *Sedum ellacombianum* and *S. spectabile* flowered normally under short-day conditions after grafting onto induced *Kalanchoë* stocks. *Sedum ellacombianum* scions always showed a change from short-day habit to long-day habit before flowering. The degree of succulence of leaves of *Kalanchoë* stocks did not affect the habit of *Sedum* scions. These results indicate that in *S. ellacombianum* long-day habit and flowering are caused by the same stimulus.—Lab. Tuinbouwpl., Wageningen.

2079. Kazarjan, V. O., and Avundžjan, E̊. S.
The effect of the photoperiodical regime on the progress of physiological processes in the roots of annuals. [Russian.]
Doklady AN ArmSSR, 1955, **20**(4): 143-7, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,385.

The short-day plant *Perilla nankinensis* was grown for 1 month in a 10 hr. day and in continuous light. Determinations were made in the roots of the activity of invertase, content of different forms of nitrogen and sugars, activity of catalase and peroxidase and ability to adsorb nitrogen and sugars. In plants under long-day conditions the synthesizing activity of invertase predominated over the hydrolysing activity. Under short-day conditions the hydrolysing and synthesizing activities of invertase were almost equal. The hydrolytic activity of invertase and the activity of catalase and peroxidase were considerably higher under short-day than under long-day conditions, consequently the contents of non-protein nitrogen and soluble sugars and also the ratio of soluble and non-soluble sugars were greater in plants under short-day conditions. The adsorbing ability was also greater under short-day conditions. It is concluded that the more rapid aging of the leaves under the influence of the optimum photoperiod leads to the more rapid ageing of roots, which obtain their plastic substances from the leaves.

2080. Čajlahjan, M. H.
Photoperiodic sensitivity of isolated leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **118**: 197-200, bibl. 10, illus.

Leaves from *Perilla nankinensis* grown under long-day conditions were detached with either a small piece of stem, from which all the buds were removed, or by cutting through the base of the petiole. The isolated leaves developed roots when they were cultured in water or Knop solution (½ strength) under short-day (10 hr.) and long-day conditions for 32 days and then grafted on plants maintained throughout under long photoperiods. The grafts were made by decapitating and defoliating the rootstocks and inserting in each of them 2 of the shaped stems or petioles of the treated leaves after removal of all the roots. The grafts were then grown under long-day conditions. The short-day-treated leaves induced flower bud formation and flowering, while the long-day-treated control leaves did not. Scion leaves from both water and nutrient cultures induced similar responses. These results show that isolated leaves without roots and bud meristem, grown with or without mineral nutrition, are able to respond to photoperiodic treatment by accumulating the specific substances necessary for flowering.

2081. Stanko, S. A.
The regulating rôle of anthocyanins (pigments of cell sap) in the opening of the stomata of plant leaves. [Russian.]
Vestn. AN KazSSR, 1956, No. 9, pp. 102-9, bibl. 23, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 81,863.

The rate of stomatal opening in plants of the same species or families producing or not producing anthocyanins was studied. In plants containing anthocyanin the stomata were generally fully open and functioned during the whole day irrespective of place of growth. Anthocyanin-containing plants adapted themselves to a wider region of the visible spectrum; during photosynthesis they produced mono- and disaccharides but not starch, which resulted in a considerable increase of osmotic pressure, thus providing better water absorption and water retention. In spite of more intensive transpiration these plants were more resistant to drought, dry winds and frost.

2082. KENNEDY, J. S., AND BOOTH, C. O.
Water relations of leaves from woody and herbaceous plants.
Nature, 1958, **181**: 1271-2, bibl. 5.

When detached mature leaves of *Euonymus europaeus* and sugar beet were brought to full turgor and then allowed to wilt, the beet leaves became very flaccid and their volume fell with their loss of water, whereas the volume of the firmer *Euonymus* leaves fell much less relative to their loss of water, implying that their tissue shrinkage was mainly internal. The estimated volume of the intercellular air spaces in beet shrank faster than the whole leaf, whereas in *Euonymus* it rose to a peak and was still above its turgid value at the end of the experiment. Observations on other woody and herbaceous leaves, including poplar, peach, potato and broad bean, showed similar differences. A second difference found was that the leaf stomata of *Euonymus* remained open at lower leaf water contents than those of beet. Thus it appears that leaves of woody plants both surrender water more freely than those of herbaceous plants and are able to do so with less injurious consequences.—A.R.C., Ent. Field Stat., Cambridge.

2083. AVUNDŽJAN, E̊. S., AND GABRIELJAN, G. G.
On the physiological nature of the ageing of leaves in annuals. [Russian, with Armenian summary.]
Tr. Botan. In-ta AN ArmSSR, 1956, **10**: 139-57, bibl. 33, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 81,868.

To retard the ageing process in leaves one group of tobacco plants was topped; accelerated ageing was induced in another group by a complete mineral fertilizer. Determinations were made of the protease activity, amino acid infiltration and the content of different forms of N in the leaves. Amino acid infiltration and protein synthesis reached their maximum during vegetative growth, but the greatest proteolytic activity occurred during flowering. Topping prolonged amino acid infiltration and protein synthesis. During development the ratio of non-protein-N to protein-N gradually increased, thus in the topped plants it was considerably higher than in the controls. In *Perilla nankinensis* the ability of leaves to adsorb glycocoll and glucose was greatest during vegetative growth; during intensive ageing desorption occurred. When the leaves of the upper tiers were given short days and the lower ones long days, the intensively ageing upper leaves exerted a considerable influence on the lower leaves. Artificial checking of the flow of plastic substances from the leaves led to a considerable rise in synthetic activity in the leaves, an increase of sugar, N and dry matter contents and a retardation of ageing.

2084. BIGGS, R. H., AND LEOPOLD, A. C.
Factors influencing abscission.
Plant Physiol., 1957, **32**: 626-32, bibl. 25.

From the results of abscission tests using petiole explants from red kidney bean the following conclusions were drawn: (1) The time for abscission of explants is greatly influenced by the age of the leaf, and the presence of light, sugar and auxin during the test. (2) Sucrose was found to stimulate the abscission of explants low in endogenous substrates under conditions of darkness, and to inhibit abscission at high concentrations in all but older explant samples. (3) Auxin (naphthaleneacetic acid) was found to promote abscission at low concentrations (e.g., 10^{-5}M) and inhibit at high concentrations (e.g., 10^{-3}M) within a wide variety of conditions and ages. The promotion effect was not obtained with young explants held in darkness, or with older explants which had a low carbohydrate reserve unless substrate was added. (4) It is concluded that auxin generally has a two-phase action on abscission, but that its action is mediated by leaf age, light, and the supply of substrates such as sugar. [From authors' summary.]

Growth substances.

(*See also* 2071, 2084, 2116, 2146c, d, f, i-m, p, s, w, 2147a, b, f, j, 2210-2214, 2238 l, 2243, 2245, 2290-2293, 2444, 2448i, Weeds and weed control section, 2520-2525, 2574, 2590-2592, 2630, 2649-2651, 2655, 2656, 2660, 2677-2680, 2688, 2717j, 2740, 2791, 2831, 2850-2854, 2862, 2875-2877, 2915-2917, 2934, 2938, 2942, 2972, 2973, 2981, 3016, 3066, 3137.)

2085. MITCHELL, J. W., LIVINGSTON, G. A., AND MARTH, P. C.
Test methods with plant-regulating chemicals.
Agric. Handb. U.S. Dep. Agric. **126**, 1958, pp. 68, bibls, illus.

The publication is divided into 3 parts, as follows: methods of applying regulating compounds and of studying the responses they induce; methods of detecting regulating compounds; and techniques in general use. Each method is carefully described, with clear illustrations in several cases.

2086. FAWCETT, C. H., AND OTHERS.
The metabolism of certain acids, amides and nitriles within plant tissues.
Proc. roy. Soc., Ser. B, 1958, **148**: 543-70, bibl. 41.

The plant growth-regulating activities of the first six members of the homologous series ω-(2:4-dichlorophenoxy) alkanecarboxylic acids and the corresponding amides and nitriles have been assessed in the wheat cylinder, pea curvature, pea segment and tomato-leaf epinasty tests. The alternation in activity shown by the homologous series of acids and the production of 2:4-dichlorophenoxyacetic acid and of 2:4-dichlorophenol from alternate members indicates that β-oxidation of the side-chain of these acids occurs within wheat and pea tissues. The behaviour of the amides was similar to that of the acids and explicable in terms of hydrolysis to corresponding acid within the tissue followed by β-oxidation. Only the first member of the nitrile series was active in the pea and tomato tests, though in the wheat cylinder test all showed some activity, that of the propionic derivative, however, being only slight. With the exception of this compound, the nitriles yielded 2:4-dichlorophenoxyacetic acid and all gave some 2:4-dichlorophenol when metabolized in wheat tissue. [From authors' summary.]—A.R.C. Unit, Wye.

2087. Salisbury, F. B.
Growth regulators and flowering. I. Survey methods.
Plant Physiol., 1957, **32**: 600-8, bibl. 39.

The results of treating *Xanthium pennsylvanicum* with various growth substances in relation to photoperiodic induction of flowering indicated that: MH, dalapon and 2,4-D inhibit development of the floral bud. IAA, NAA and low concentrations of 2,4-D most likely cause a destruction of flowering hormone in the leaf in either light or darkness. DNP inhibits synthesis of flowering hormone. Cobaltous ions interfere with the mechanism which controls the critical night length. Results with 2,4-D indicate that its auxin effects might be separable from its herbicidal effects. Results with DNP show that the herbicidal effects of this compound on cocklebur depend upon a period of darkness following application of the chemical, although development of floral buds is independent of this response. [From author's summary.]

2088. Goodman, R. N., and Dowler, W. M.
The absorption of streptomycin by bean plants as influenced by growth regulators and humectants.
Plant Dis. Reptr, 1958, **42**: 122-6, bibl. 22.

Two growth regulating substances, naphthyl acetamide and gibberellic acid, as well as a number of hydroxy-compounds increased the absorption of streptomycin by bean plants. Indole-3-acetic acid and a combination of methyl cellosolve and Carbowax 4000, when formulated with streptomycin, depressed the absorption of the antibiotic by the test plants. [From authors' summary.]—Univ. Missouri, Columbia.

2089. Baskakov, Ju, A., and Mel'nikov, N. N.
On the conversion of growth stimulants in the plant (1-alkylindolyl-3-acetic acids). [Russian.]
Fiziol. Rast., 1956, **3**: 208-13, bibl. 25, from *Ref. Ž. (Biol.)*, 1957, No. 20, Abstr. 86,074.

Four new homologues of indolylacetic acid were synthesized and the effect of these on the root formation of bean cuttings was studied. The greatest physiological activity was shown by 1-ethylindolyl-3-acetic acid (50% greater than by indolylacetic). It is suggested that these compounds are converted into indolylacetic acid in the plant by the oxidation of the alkyl groups.

2090. Vlitos, A. J., and Hitchcock, T. S.
Plant growth regulating activity of 3-indole-methanesulfonic acid.
Contr. Boyce Thompson Inst., 1958, **19**: 255-65, bibl. 8, illus.

IMSA induced leaf modification, stem curvature, and proliferation of intact tomato and bean seedlings; suppressed the elongation of cucumber seedling roots; and as a pre-emergence herbicide at 5 and 10 lb./acre controlled grass and broad-leaved weeds in broccoli, mustard, radish and cabbage with slight injury to all these crops except radish.

2091. Applegate, H. G., and Hamner, C. L.
Effect of foliar application of substituted benzoic acids on leaf development in *Zinnia elegans*.
New Phytol., 1957, **56**: 301-4, bibl. 3, illus.

A stimulation of vascular tissue differentiation in zinnia leaves occurred at all concentrations of substituted benzoic acids tested. At low concentrations parenchymous tissues were induced to remain meristematic, while at high concentrations they were undifferentiated or unexpanded.—Mich. St. Univ., E. Lansing.

2092. Linder, P. J., and others.
Movement of 2,3,6-trichlorobenzoic acid from one plant to another through their root systems.
J. agric. Food Chem., 1958, **6**: 356-7, bibl. 5, illus.
Linder, P. J., Marth, P. C., and others.
Roundabout route to plants.
Agric. Res. Wash., 1958, **6**(8): 12.

2,3,6-TBA applied to stems or leaves of bean plants was absorbed and translocated throughout the plants, causing growth modification. When treated plants were grown in water and untreated plants were subsequently grown in the same water, the latter soon showed abnormal growth. Similar results were obtained when treated plants grown in soil were replaced by untreated plants or when one treated and one untreated plant were grown in the same pot. Transfer of the compound also occurred between the roots of several species, including beans and cucumbers. Other chemicals found to possess similar mobility were 2,3,5,6-tetrachlorobenzoic acid and MOPA [see *H.A.*, 24: 1110].—U.S. Dep. Agric., Plant Indust. Stat., Beltsville, Md.

2093. Kessler, B., and Moscicki, Z. W.
Effect of triiodobenzoic acid and maleic hydrazide upon the transport of foliar applied calcium and iron.
Plant Physiol., 1958, 33: 70-2, bibl. 10, illus.

In apple seedlings and tomatoes, TIBA, as 100 p.p.m. spray, increased the downward transport of Ca but MH, at the same strength, was much less effective. Similarly TIBA pre-treatment enabled foliar-applied Fe to penetrate chlorotic leaves of peach and plum and caused a considerable increase in chlorophyll formation. MH had no effect on Fe transport. The increased mobility and downward transport of nutrients caused by TIBA may be related to its suspending effect on polarity.—Agric. Res. Stat., Rehovot, Israel.

2094. González Zúñiga, J. J., and Rojas Garcidueñas, M.
Acción del ácido 2,4-diclorofenoxiacetico en los meristemos apicales y zonas más diferenciadas de la radícula de frijol (*Phaseolus vulgaris* L.). **(Action of 2,4-dichlorophenoxyacetic acid on apical meristems and more differentiated regions of the radicle of beans (*Phaseolus vulgaris*.** [English summary 15 lines.]
Ciencia, 1957, **17**: 14-15, bibl. 4.

Bean seeds soaked in 100 p.p.m. 2,4-D were germinated for 3 days. Longitudinal sections of radicles showed significantly shorter apical meristem cells in treated than in non-treated specimens, but cell length in the upper parts of radicles was unaffected by treatment.

2095. OSBORNE, D. J.
The role of 2,4,5-T butyl ester in the control of leaf abscission in some tropical woody species.
Trop. Agriculture Trin., 1958, **35**: 145-58, bibl. 7, illus.

N-butyl,2,4,5-trichlorophenoxyacetate (and allied plant growth regulators) are effective defoliants of many tropical woody species when they are applied as droplets to the leaf lamina. Experiments designed to investigate the nature of the defoliating action of this type of compound are described. All naturally yellow and senescent leaves of the species tested were found to produce a substance which accelerated abscission in abscission zones of their own species. Little or none of this substance could be demonstrated in green leaves. After an application of 2,4,5-T to green leaves an abscission-retarding activity could be demonstrated in diffusates from the petiole. The activity decreased with time and was replaced by an increasing abscission-accelerating activity prior to leaf fall. The areas around the treated spots were by then visibly yellow and senescent, while the treated areas retained their green colour. It is proposed that compounds such as 2,4,5-T exert their defoliating action in tropical species by causing local increases in metabolic activity by causing local increases in metabolic activity below the droplets. This results in a drain of the metabolic substrates from the surrounding areas to the treated areas and causes a premature senescence in the untreated parts of the blade. As these areas become progressively senescent, increasing amounts of the abscission-accelerating substance are produced and a premature leaf fall ensues. [Author's summary.]—Univ. Coll., Ibadan, Nigeria.

2096. TOWERS, G. H. N., HUTCHINSON, A., AND ANDREAE, W. A.
Formation of a glycoside of maleic hydrazide in plants.
Nature, 1958, **181**: 1535-6, bibl. 9, illus.

Apple and tobacco were among the plants treated with radioactive maleic hydrazide, but results are described only for wheat, in which about 15% of the maleic hydrazide in the leaf was converted into a glycoside.

2097. PIRONE, P. P.
Gibberellin—plant growth stimulator.
Gdn J. N.Y. bot. Gdn, 1958, **8**: 42-5, illus.

This popular review discusses, among other things, the acceleration of growth and seed production in vegetables, thinning and fruit enlargement in grapes, lawn rejuvenation and seed treatment. Responses of geranium, scented geranium (*Pelargonium graveolens*), *Oxalis bowieana*, ornamental tobacco (*Nicotiana alata*), bugle (*Ajuga reptans*), stonecrop (*Sedum* sp.), *Plectranthus australis*, fuchsia and *Solanum pseudocapsicum* are briefly described and illustrated.

2098. MCCOMB, A. J., AND CARR, D. J.
Evidence from a dwarf pea bioassay for naturally occurring gibberellins in the growing plant.
Nature, 1958, **181**: 1548-9, bibl. 8.

Extracts from growing peas of the tall variety Telephone, having R_F values of 0·6–0·8, gave significant internode elongation when applied to the base of the third node of seedlings of the dwarf pea variety Meteor. The R_F value of gibberellic acid used as a standard of comparison was 0·22, and since similar values are characteristic of gibberellins A_1 and A_2 as well as of indoleacetic acid, the active substance under assay could be none of these.—Univ. Melbourne.

2099. STEWART, W. S., AND CHING, F. T.
Horticultural research notes on gibberellic acid.
Lasca Leaves, 1957, **7**: 26-8, bibl. 4, illus.

The crystalline K salt of gibberellic acid (GA) is available commercially under the trade name Gibrel. Tomato seedlings 15 cm. high responded to 25 p.p.m. GA, as a foliar spray or in a ring of lanolin applied to the stem, by axial elongation, which was significantly greater from afternoon than from morning spraying. Similar stem treatment of seedlings of *Eranthemum atropurpureum* at the highest node caused enhanced elongation of both the adjacent internodes. Papaw seedlings treated as above for tomato responded to foliar spraying by stem elongation, but ring application to stems caused local thickening instead of elongation. Internal as well as external tissues were affected. Preliminary tests on young grape clusters indicate that GA may prove practically useful as an alternative to fruit thinning. Pansy plants sprayed with 100 p.p.m. GA showed a 46% increase in flower-stalk length 10 days later. Untreated seeds of the annual *Gilia capitata chamissonis* showed 2% viability, but soaking in 100 p.p.m. GA increased this to 32%.

2100. SCURFIELD, G., AND MOORE, C. W. E.
Effects of gibberellic acid on species of *Eucalyptus*.
Nature, 1958, **181**: 1276-7, bibl. 2.

Seedlings of several species of *Eucalyptus* were treated with gibberellic acid with the result that the plants produced taller, weaker stems with longer internodes and more, initially paler, leaves. Increase in concentration of gibberellic acid caused an increase in stem height and diameter, number of leaves and weight of stems, but a decrease in weights of leaf and root. Total weight was not significantly affected. Plants treated with gibberellic acid developed the alternate arrangement and falcate-lanceolate shape of leaves characteristic of adult plants of *E. melliodora* earlier than control plants. This suggests that gibberellic acid or a similar substance, formed within the plant, might normally be a factor controlling leaf shape.—C.S.I.R.O., Canberra.

2101. BRIAN, P. W., AND HEMMING, H. G.
Complementary action of gibberellic acid and auxins in pea internode extension.
Ann. Bot. Lond., 1958, **22**: 1-17, bibl. 20.

Using an *in vitro* technique based on the extension in light of sections from growing internodes of green dwarf-pea seedlings, it has been shown that gibberellic acid (GA) only induces extension if an auxin is present. Most work has been done with 3-indolyl acetic acid (IAA) as the auxin; maximum extension was obtained in a mixture of 10 μg./ml. IAA, 0·1 μg./ml. GA, and 2% sucrose. Higher levels of IAA were toxic but the GA concentration could be raised to 100 μg./ml. without reducing extension below the maximum. IAA could be replaced by 2:4-dichlorophenoxyacetic acid, 2-methyl-4-chlorophenoxyacetic acid, and 1-naphthylacetic acid. Extension of sections was not induced by 3-indolylacetonitrile (IAN), neither did GA have any effect in combination with IAN. Extension of internodes in intact plants, using both untreated and GA-treated plants, was compared with the extension of internodes excised from such plants and incubated in solutions containing various combinations of IAA, sucrose, and GA. It was found that, although there was no evidence of limitation of growth by insufficiently high IAA or sucrose levels, intact internodes of untreated plants extended much less than excised internodes in IAA and sucrose. On the other hand, internodes from GA-treated plants grew as rapidly as excised sections from similar plants in IAA and sucrose. On the basis of this and other evidence, it is suggested that GA neutralizes an inhibitory system in the pea shoot, which otherwise prevents the internode from extending to the full extent potentially allowed by the available auxin. It is also suggested that growth of the pea internode is normally regulated by a three-factor system, consisting of auxin, inhibitor, and a hormone with physiological properties similar to those of GA. [Authors' summary.]—Akers Res. Labs, I.C.I. Ltd., Welwyn.

2102. Applegate, H. G.

Polarity and gibberellic acid in intact plants.

Bot. Gaz., 1957, **119**: 76-8, bibl. 4.

Internode elongation in young seedlings of *Zinnia elegans* var. Scarlet Flame was increased, but not proportionally, by increasing concentrations of gibberellic acid (GA) ranging from 10^{-4} M to 10×10^{-4} M. A similar range of triiodobenzoic acid (TIBA) solutions had inhibiting effects, increasing, but not proportionally, with concentration. Mixtures of GA and TIBA in different proportions accelerated growth at rates related, but not proportional, to their GA/TIBA ratios. Thus GA was evidently not interacting with auxin to induce cell elongation and was unaffected by TIBA.—Univ. Conn., Storrs.

2103. Lang, A.

Gibberellin and flower formation.

Naturwissenschaften, 1956, **43**: 544, bibl. 1, [received 1958].

Daily treatment with 10 μg. or more of gibberellin as a cold substitute induced flowering in some Early French Forcing carrots in 1½–2½ months, but caused bolting without flowering in Danver's Half Long carrots, Hamburg parsley and Purple-Top Globe turnips. On long-day plants gibberellin was a rapidly effective substitute for day length in producing flowers in *Samolus parviflorus* and *Crepis tectorum* receiving 5 μg. daily. In *Silene armeria* and annual *Hyoscyamus niger* only some of the treated plants responded and in the latter species flower buds remained dormant, the minimal effective application being 10 μg. daily. Flowering was not induced, but stem elongation was greatly increased in *Xanthium saccharatum* by 1–10 μg. per day during long days.—Univ. Calif., Los Angeles.

2104. Lang, A.

Induction of flower formation in biennial *Hyoscyamus* by treatment with gibberellin.

Naturwissenschaften, 1956, **43**: 284-5, bibl. 6, illus. [received 1958].

Plants of *Hyoscyamus niger* were kept at a temperature above the maximum for flower induction and treated daily for 4 weeks with either 2 μg. or 10 μg. of diluted gibberellin. Elongation and flowering followed treatment under long-day conditions (18–20 hours' light), but at the higher dosage 28% of the plants remained vegetative owing to necrosis of the stem tip. Under short-day conditions elongation was less marked and was not followed by flowering. Controls remained as vegetative rosettes. [See also *H.A.*, 26: 3271.]—Univ. Calif., Los Angeles.

2105. Greulach, V. A., and Haesloop, J. G.

Influence of gibberellin on xanthium flowering as related to number of photoinductive cycles.

Science, 1958, **127**: 646-7, bibl. 18, illus.

A preliminary experiment with *Xanthium pennsylvanicum* showed that gibberellin would not induce reproductive development under long photoperiods. In a further experiment *Xanthium* plants were kept under long photoperiods for 28 days following planting. Half the plants were then treated with a 10^{-3} M solution of gibberellic acid and half were left as controls. Some of the treated and some of the control plants were continued under long days for a further 21 days, and the remainder were given 2 to 12 photoinductive short-day cycles. Gibberellin treatment overcame the reduction in stem growth produced in the controls by 4 or more photoinductive cycles. All gibberellin-treated plants had more nodes than the controls and their stems were more slender. At the end of the experiment all plants that had been continuously under long days were completely vegetative, whereas all plants that had received 6 or more photoinductive cycles had well-developed macroscopic flower buds. Control plants given 2 and 4 photoinductive cycles had only microscopic inflorescence primordia, whereas gibberellin-treated plants given 2 or 4 photoinductive cycles had macroscopic flower buds. Gibberellin also accelerated reproductive development in 6-, 8- and 10-cycle groups. These results confirm that gibberellin does not substitute for the short-day requirements of *Xanthium* so far as initiation of reproductive development is concerned, but that it can substitute for the accelerating effect of short-day cycles on reproductive development once initiation has taken place.—Univ. N. Carolina, Chapel Hill.

2106. Carr, D. J., McComb, A. J., and Osborne, L. D.

Replacement of the requirement for vernalization in *Centaurium minus* Moench by gibberellic acid.

Naturwissenschaften, 1957, **44**: 428-9, bibl. 6, illus.

The rosette forms of this species normally flower only after vernalization. Rosette plants, some in continuous light, others with 8-hour days, were treated daily with 2 or 5 μg. of gibberellin for 15 days or until elongation was established. Treatment in continuous light promoted elongation and within 4 weeks flower buds began to appear. Under short-day conditions elongation ceased soon after treatment stopped and aerial rosettes were formed at stem tips. No flower buds appeared. Untreated plants remained vegetative rosettes irrespective of day length.—Melbourne Univ., Vict.

2107. Bünsow, R., and Harder, R.
Blütenbildung von *Lapsana* durch Gibberellin. **(Flower formation in *Lapsana* due to gibberellin.)**
Naturwissenschaften, 1956, **43**: 527, bibl. 1, illus. [received 1958].

The annual *Lapsana communis* kept under continuous short-day lighting remained a vegetative rosette, but the same species treated with 1 drop of 50 mg./l. gibberellin daily showed marked internode elongation after 3 weeks, and visible flower buds after 6 weeks, when treatment was stopped. After a further 8 weeks the total height was 90 cm. and ripe seed was present. —Pflanzenphysiol. Inst., Univ. Göttingen.

2108. Čajlahjan, M. H.
The effect of gibberellins on the growth and flowering of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 1077-80, bibl. 11, illus.

The experimental plants included *Nicotiana silvestris*, *Rudbeckia bicolor*, *Phaseolus multiflorus*, *N. tabacum* and *Perilla nankinensis*, of which one half were grown in short- and the other in long-days. One drop of gibberellic acid of 0·02% concentration was applied every day to the growing point or the centre of the leaf rosette of each plant. From the results of these experiments and those of other workers the author concludes that: (1) The great majority of long-day species when treated with gibberellins under short-day conditions form stems, flower and fruit. (2) Winter forms [winter rape] and seedlings of biennials bolt when denied the vernalizing effect of low temperatures and treated with gibberellins. (3) Short-day species treated with gibberellins under long-day conditions are unable to flower and fruit.

2109. Humphries, E. C.
Effect of gibberellic acid and kinetin on growth of the primary leaf of dwarf bean (*Phaseolus vulgaris*.)
Nature, 1958, **181**: 1081-2, bibl. 3.

Gibberellic acid was shown to accelerate expansion of the primary leaf of dwarf bean, but the preliminary stimulation was followed by a subsequent depression of growth, with the result that the final area attained was identical with that of leaves receiving no treatment. Kinetin applied by itself depressed the rate of leaf expansion, but the depressing effect was overcome by the presence of gibberellic acid.—Rothamsted exp. Stat.

2110. Pfnür, E.
Die Wirkung von Gibberellin-Azid bei der Samenkeimung. **(The effect of gibberellic acid on seed germination.)** [English summary ¼ p.]
Gartenbauwiss., 1957, **22**: 541-9, bibl. 63, illus.

Soaking seeds of *Lupinus polyphyllos* in 10 or 25 p.p.m. gibberellin for several hours did not improve germination. When the seedbed was watered with a gibberellin solution, however, the germination percentage was improved and seedling development appeared to be more vigorous.

2111. Bukovac, M. J., and Wittwer, S. H.
Comparative biological effectiveness of the gibberellins.
Nature, 1958, **181**: 1484, bibl. 5.

A study of the comparative biological activities of the gibberellins relative to epicotyl extension in beans, stem elongation and flowering in lettuce and dill, and parthenocarpic fruit growth in tomatoes has established the following order of activity: $A_3 > A_1 \simeq A_4 > A_2 >$, methyl ester $A_1 \simeq$ methyl ester A_3.—Mich. St. Univ. East Lansing.

Tissue culture.

(*See also* 2147g.)

2112. Maheshwari, N., and Lal, M.
***In vitro* culture of ovaries of *Iberis amara* L.**
Nature, 1958, **181**: 631-2, bibl. 5, illus.

Normal growth of both ovary and ovules of *Iberis amara* flowers was obtained in Nitsch's medium. The addition of IAA or kinetin resulted in fruits which were sometimes even larger than normal, but the addition of 2,4-D+kinetin arrested growth of both endosperm and embryo. Removal of calyx and corolla inhibited growth of the ovaries.—Univ. Delhi.

2113. Maheshwari, N.
***In vitro* culture of excised ovules of *Papaver somniferum*.**
Science, 958, **127**: 342, bibl. 10, illus.

Ovules were extracted from young opium poppy capsules and were successfully cultured on Nitsch's medium plus a mixture of vitamins. The ovules grew to maturity in 23 days compared with about 18 days in normal capsules. The addition of kinetin and IAA to the medium resulted in the development of embryos and endosperm similar to those in naturally ripening seeds; some of these cultures had germinated to produce seedlings by the time they were 23 days old. It is considered that ovule culture offers an interesting new approach to the study of seed physiology.—Univ. Delhi.

Seeds.

(*See also* 2146o, z, 2147d, 2726-2729, 2780n, 2845, 3226a,o.)

2114. Marras, F.
Osservazioni su di un nuovo metodo biochimico per la determinazione rapida della capacità germinativa dei semi. **(Observations on a new biochemical method for determining the germination capacity of seeds.)**
Studi sassaresi, *Sez. III*, 1955, 3: 108-17, bibl. 5 (received 1958).

Lakon's tetrazolium method is compared with Brücher's peroxidase method, originally devised for cereals. The latter has the sole advantage of speed and has proved completely unreliable for seeds of beans (*Phaseolus* and

Vicia), peas, melons, watermelons, castor beans and wild olives.

2115. Wareing, P. F., and Black, M.
Similar effects of blue and infra-red radiation on light-sensitive seeds.
Nature, 1958, **181**: 1420-1, bibl. 4.

Experiments showed that "in the seed of both lettuce and *Nemophila insignis* inhibitory effects are produced by infra-red and blue, and in lettuce seed these two spectral regions show similar interaction with red. These observations suggest that either the photoreceptor involved in the infra-red effects has an absorption region also in the blue, or, alternatively, that some distinct blue absorbing photoreceptor is capable of energy transfer to the infra-red receptor."—Univ. Manchester, and Univ. Saskatchewan, Saskatoon, Canada.

2116. Libbert, E.
Wechselwirkungen zwischen Auxinen und Inhibitoren bei Keimungsversuchen. (**Interactions between auxins and inhibitors in germination experiments.**) [Spanish summary ½ p.]
Phyton, 1957, **9**: 81-105, bibl. 47.

Within a population of seeds the rate of germination of individual seeds followed a normal distribution pattern. With probit transformation, the time course of germination within a population followed a straight line. In experiments in which the combined action of auxins and inhibitors is studied, the calculation of theoretical values for germination should be based not on absolute values or percentages but on probits. The effects of 2 non-interacting treatments are not additive but multiplicable. There was no interaction between auxin (IAA) and inhibitors (dichloranisol, naphthylmethylsulphide propionic acid, maleic hydrazide). Chlorophenoxyisobutyric acid reduced the inhibition of germination caused by IAA. This effect, which can be formulated mathematically, is interpreted as an anti-auxin effect. 2,3,5-Triiodobenzoic acid behaved similarly and its effect, which can also be formulated mathematically, is interpreted as a reduction of IAA absorption. Triiodobenzoic acid also reduced the inhibition of germination caused by high concentrations of coumarin. IAA and coumarin mutually intensified the inhibiting effect of each other on germination of *Lepidium* and *Sinapis* but not of *Linum*. There was a similar interaction between indolebutyric acid and coumarin, but not between 2,4-D and naphthylacetic acid. IAA and indolebutyric acid appeared to have the same point of attack for their inhibitory action. Among the growth substances tested, only citric and tartaric acids stimulated germination.—Humboldt Univ., Berlin.

2117. Lachover, D., Plaut, M., and Angel-Malachi, S.
Some effects of thallium sulfate on plant growth, and its behavior in the soil.
Ktavim, 1958, **8**: 1-10, bibl. 13.

When thallium sulphate (a rodenticide) was applied to the soil as a salt, germination of tomatoes and beans was not affected, but plant growth was significantly reduced. The effect of TS-treated grains (used as bait) on germination of the crop seed was correlated to seed size, toxicity being greatest with smallest seeds. Irrigation of treated soil before sowing reduced the toxic effect of thallium sulphate on germination, and with tomatoes germination was raised from 10·9% to 56%. Analyses showed that thallium sulphate does enter the seed tissues.

Irradiation.

(*See also* 2370, 2512, 2513, 2517, 2584, 2631, 2649, 2873, 2874.)

2118. Hicks, W. W.
A series of experiments on trees and plants in electrostatic fields.
J. Franklin Inst., 1957, **264**(1): 1-5, from *Biol. Abstr., Sect. D*, 1958, **32**, No. 10,091.

The object of the experiments reported was not to obtain quantitative data, nor even to establish any consistent direction of change, but to study the effects of ionized air upon plants. It was found that vegetative growth of pelargoniums, rhododendrons, beans and holly trees was stimulated by electric fields. This was greatest in the positive fields, next greatest in the negative fields, less for the controls, and least in grounded cages surrounding the plants. There was evidence that the stronger the field the greater the growth. Other experiments included cherry and avocado trees equipped with antennae, and camellias and geraniums within Hertz rings.

2119. Lučnik, N. V.
The effect of yeast extracts on irradiated organisms. [Russian, with English summary ½ p.]
Biohimija, 1958, **23**: 146-53, bibl. 24.

Yeast extracts, applied after γ-irradiation with Co^{60}, markedly reduced growth inhibition and the number of chromosomal aberrations in the root tips of pea seedlings. The optimum dilution was 1 : 1,000.—Dep. Biophys. Ural Branch Acad. Sci. U.S.S.R., Sverdlovsk.

2120. Guljakin, I. V., and Judinceva, E. V.
Problems of the agrochemistry of the radioactive isotopes of strontium, caesium and other fission products. [Russian, with English summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 15-34, bibl. 15.

In water, sand and soil culture experiments with plants including pea, it was found that plants can accumulate large amounts of radioactive fission products without vital injury. Sr^{90} was taken up most readily and 80–90% of the product accumulated in the aerial parts of the plants. The content of Cs^{137} was also high and concentrated in the reproductive organs. In acid soils of low humus content the uptake of fission products was reduced by application of lime and organic manure, and in general N, P and K treatments were advantageous. The most effective way of reducing uptake was, however, by applying the products deep into the soil. It is suggested that under certain conditions plants may be able to purify the soil from radiocontamination. [See also *H.A.*, 28: 1038 and 1039.]

Nutrition.

(*See also* 2195-2204, 2438, 2717k.)

2121. Bukovac, M. J., and Wittwer, S. H.
Absorption and mobility of foliar applied nutrients.
Plant Physiol., 1957, **32**: 428-35, bibl. 22, illus.

Using radioactive isotopes and bean seedlings, Rb, Na and K were shown to be most readily absorbed and highly mobile. Ca, Sr, Ba and, later, Mg were absorbed but immobile. P, Cl, S, Zn, Cu, Mn, Fe, Mo were intermediate, with mobility decreasing in the order given.—Mich. St. Univ., E. Lansing.

2122. Kalinkevič, A. F.
The effect of synthetic urea applied in foliar sprays on the formation of sulphhydryl groups in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 723-4, bibl. 10.

On the basis of earlier work it is suggested that the favourable effect of urea sprays on plants is due, in the first case, to the formation of sulphhydryl groups. In the experiments described all 5 forms of N fertilizer sprayed on 1-month-old lettuce plants increased the formation of sulphhydryls, by far the greatest increase being produced by synthetic urea.

2123. Koontz, H., and Biddulph, O.
Factors affecting absorption and translocation of foliar applied phosphorus.
Plant Physiol., 1957, **32**: 463-70, bibl. 13, illus.

The effects of various factors on the absorption and translocation of foliar-applied P^{32} in bean plants were determined. A spray application method proved superior to leaf vein injection and droplet methods. The amount of P translocated from the treated leaf in a 24-hour period increased as the amount applied increased; but it was independent of leaf area treated, except possibly at the highest concentration (30 mM), and of the leaf surface treated (upper or lower). More P was translocated from older (lower) leaves than from younger (upper) leaves (very young leaves did not export P), and the leaves contributed P to the root in proportion to their proximity to it. All leaves which exported P contributed approximately equal amounts to the stem apex. Translocation of applied P was greatest with NaH_2PO_4. The amount translocated appeared to be directly related to the drying time of the solution on the leaf. Absorption fell off after about 30 hours. Translocation was mainly downwards at first and, later, upwards in the plant. [From authors' summary.]—St. Coll. Wash., Pullman.

2124. Šetlík, I., and Trnková, A.
Absorpce fosfátových iontů pokožkou listů. **(The absorption of foliar applied phosphate ions.)** [English and Russian summaries ¾ p. each.]
Preslia, 1957, **29**: 337-48, bibl. 29, illus.

In a series of experiments on *Pelargonium zonale* and sugar beet the rate of absorption and translocation of P^{32} applied to attached or detached leaves by different methods was studied. It was found that absorption by the leaf epidermis was not affected greatly by the method of application. Uptake of P persisted over a number of days and its rate was controlled by internal factors [which are not clearly defined].

2125. Uhler, R. L.
Synthetic chelates in field and greenhouse studies.
Diss. Abstr., 1957, **17**: 2372, being *Publ.* 22,558 of 164 pp.

The chelates Fe-EDTA and Fe-HEEDTA, applied at 30 to 60 lb. per acre, did not significantly affect yields of non-chlorotic celery and endive. Both chelates successfully corrected chlorosis in blueberries, greenhouse roses and several ornamental plants. In tobacco grown in solution culture Fe was translocated more readily at pH 5 than at pH 7, and translocation was enhanced by EDTA.—Rutgers Univ.

2126. Pejve, Ja. V., and Krauja, A. E.
The effect of microelements on the dynamics of redox enzymes in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 906-9, bibl. 11.

Cabbage, tomato, oat and wheat seeds were treated with B, Cu, Zn and Mn at various concentrations and the effect of these on ascorbinoxidase, polyphenoloxidase and peroxidase activity in the seedlings was studied.

2127. Elgabaly, M. M., and Abdel Ghani, A. M.
Specific effects of adsorbed ions on plant growth.
Soil Sci., 1958, **85**: 161-6, bibl. 7, illus.

Peas grown in [soil, bentonite and resin] systems having different exchange capacities but equal concentration of adsorbed Ca+Na or Mg+Na at different degrees of Na saturation showed reduction in growth as the exchange capacity increased. This was true at all degrees of Na saturation studied. In Na-Mg systems peas failed to grow at all Na saturations in the three systems. Ca/Na and Mg/Na were little influenced by exchange capacity but were definitely higher in peas than barley. [From authors' summary.]—Univ. Alexandria, Egypt.

2128. Lucenda Conde, F., and Aragonés Apodaca, R.
La lana de vidrio como soporte de cultivo en el estudio sobre deficiencias de boro en plantas. **(Glass wool as a culture substrate in the study of boron deficiency in plants.)** [English summary 8 lines.]
An. Edafol. Fisiol. veg., 1957, **16**: 1099-1109, bibl. 7, illus.

Glass wool, used as a filling for waterproof experimental pots receiving nutrient solutions, contained so little total B (0·2%) that it did not prevent B-deficiency symptoms from appearing in 5 species of test plant, including runner beans and brussels sprouts.

2129. Ovčarov, K. E.
Experimental hypervitaminosis in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 337-40, bibl. 10.

In water culture experiments at the Timirjazev Institute of Plant Physiology excessive rates of vitamins in the nutrient solution were found to disrupt plant metabolism. Numerous examples are given showing how vitamins C, B_1, B_2 or PP at 0·01 to 1% concentrations caused necrotic spots and other discolorations on leaves, and reductions in the contents of water, ascorbic acid or phosphorus in certain plants including bean, tomato and carrot.

2130. Gusejnov, B. Z.
The effect of substances of petroleum origin on the growth and development of tree seedlings. [Russian, with Azerbajdžan summary.]
Doklady AN AzerbSSR, 1956, **12**(7): 519-23, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,160.

The addition of 4% bituminous rock or shale to mineral fertilizers had a favourable effect on the growth, dry matter accumulation and leaf area expansion of mulberry and *Maclura* sp.

Soils, composts and irrigation.

(*See also* 2146h, t, 2188-2194, 2313, 2515, 3219, 3226i.)

2131. Wiersum, L. K.
The relationship of the size and structural rigidity of pores to their penetration by roots.
Plant and Soil, 1957, **9**: 75-85, bibl. 4, illus.

Seeds of cabbage, wallflower, cress, African marigold, morning glory, sunflower, tomato, spinach and sweet pea were sown on sintered glass discs with different pore sizes, placed in contact with a moist substream. In no case did the roots enter pores 90–150 μ in diameter and only cabbage roots entered those 150–205 μ in diameter. The largest pores tested (200–500 μ) were penetrated by the roots of all the seedlings. In each instance the diameter of the pore exceeded that of the penetrating root tip. Rigidity of pore structure was another factor inhibiting penetration. In the field, the effects of mechanical resistance are so similar to those of excess of water and deficient aeration as to make separate investigation difficult.—Inst. Soil Fert., Groningen, Netherlands.

2132. Dempster, C. D.
Doing without loam for bedding plant compost.
Grower, 1958, **49**: 728.
(Dempster, C. D.)
Clay dust compost solves the loam problem.
Comm. Gr, 1958, No. 3245, pp. 569-71.

Bedding plants, pot plants and vegetable seedlings have been successfully grown in a compost of 50 parts sharp sand, 40 parts granulated peat and 10 parts finely powdered clay to which a fertilizer mixture, including N in a quickly-available form, had been added. The best results were obtained when the compost was kept moist. Difficulties of obtaining satisfactory loams and of loam sterilization treatments may be avoided by using clay dust in composts.

2133. Der deutsche Gartenbau.
[Irrigation.] [In German.]
Dtsch. Gartenb., 1958, **5**: 85-113, bibls, illus.

This number (Heft 4) of the journal contains 13 articles on horticultural aspects of irrigation. The articles are as follows: Irrigation, one of the important methods of increasing yields, by J. Reinhold; The effect of irrigation on soil structure, by F. Klatt; Profitability of supplementary irrigation in vegetable growing in the field, by E. W. Paasch; Cultural principles for supplementary irrigation of vegetables in the open, and Supplementary irrigation for early vegetable crops, by by H. Fröhlich; Irrigation of vegetables under glass, by O. Lekve and J. Lanckow; The significance of irrigation for frost protection in field vegetables, by K. Witte; Recent methods of watering ornamental plants, by H. Rupprecht; Problems of watering in peat nurseries, by B. Stahn; Supplementary watering and irrigation for frost protection in fruit crops, by G. Friedrich and D. Schwope; The value of town sewage in vegetable and fruit growing, by R. Quaas; Observations on the present position of irrigation technique, by G. Vogel; and Layout of a field irrigation system, by O. Fritzsche.

Glasshouses.

(*See also* 2146g, x, 2187, 2516.)

2134. Henrion, G.
La tôle ondulée translucide en polyester dans la construction des serres. (**Corrugated translucent polyester sheeting in glasshouse construction.**)
Bull. hort. Liège, 1958, **13**: 73-6.
Habran, R.
Quelques résultats d'essais avec tôles ondulées en polyester. (**Some results of trials with corrugated polyester sheeting.**)
Bull. hort. Liège, 1958, **13**: 76-9.

The construction of a glasshouse using corrugated sheets of glass fibre impregnated with polyester is described. Construction costs were similar to those of a normal glasshouse, while light intensity was higher than under glass. Sheeting of various colours was used in forcing strawberries but results were not conclusive. There was little difference in final growth of various vegetables under glass and polyester sheets but there was an indication of quicker, earlier growth under polyester, and no scorching occurred. Tests with flowers were unsuccessful.

2135. Edwards, R. I., and Moulsley, L. J.
Preliminary measurements of the distribution of light in a glasshouse.
J. agric. Engng Res., 1958, **3**: 69-75, bibl. 3, illus.

Light measurement by a photometer and a solarimeter is described. Light measurements in an empty glasshouse showed considerable variation over the plane area. Light distribution on dull days tended to be more uniform than on bright days. It is suggested that photometer height should be related to crop height.—N.I.A.E., Wrest Park, Silsoe.

2136. Folley, R. R. W.
Studies in the economics of intensive horticultural holdings. Report No. 2. Management aspects of horticultural production under glass.
[*Publ.*] *Wye Coll. Dep. agric. Econ.*, 1958, pp. 27, 5s.

This report is an economic analysis of the way in which labour and capital are combined in nurseries, and the effect of their relationship on the productivity of each. Two conclusions have been reached, namely that diminishing returns to size of business (determined by amount of glass on the nursery) can be observed in the glasshouse industry, and that increasing returns to working capital can be observed in the expenditure on glasshouse crops. [For the first report see *H.A.*, 28: 59.]

2137. Folley, R. R. W.
Studies in the economics of intensive horticultural holdings. Report No. 3. Investment aspects of horticultural production under glass.
[*Publ.*] *Wye Coll. Dep. agric. Econ.*, 1958, pp. 36, 5s.

In analysing economic returns of the group of nurseries studied, the following are among the conclusions which have been reached. There is a tendency for the productivity of glass to decline when a nursery becomes largely covered over with glass. Nurseries with about 2 acres of glass produced most new value and made the highest profits, but land and capital were most productively used on nurseries where there was about ½ acre of glass. Moderate investment per acre is also desirable; percentage returns on capital were lowest with heated glass, and investment in mixed types of glass seemed most worthwhile. The author describes the most profitable type of nursery.

Machinery and new devices.

(*See also* 3180, 3185.)

2138. Hessenthaler, W. H.
Machine laying of polyethylene mulch.
Agric. Engng St. Joseph, Mich., 1958, **39**: 235-6, illus.

A demonstration model is described which can be made from parts of conventional farm cultivating equipment. It will lay mulch at a rate of more than an acre per hour and can be used even during windy weather.—Bakelite Co., Bound Brook, N.J.

2139. Read, D. C.
Note on a machine for subsurface application of granular insecticides.
Canad. J. Plant Sci., 1958, **38**: 277-80, bibl. 1.

A machine is described which has been used successfully on small plot and field scales to apply insecticide for control of cabbage root fly in swedes.—Sci. Serv. Lab., Charlottetown, Prince Edward Is.

2140. Crowder, J. P., and Schmeling, B. V.
A device for seeding greenhouse flats.
Weeds, N. York, 1958, **6**: 59-60, illus.

A method of applying small samples of seeds to greenhouse flats is described. Very uniform seed distribution was obtained with rates as low as 0·5–3 ml. seed on a flat 10 × 14 in.—*Weed Abstr.*, 7, No. 802.

2141. Wright, W. J.
Stop that check with a paper wall.
Grower, 1958, **49**: 1009, illus.

The use of paper partitions in pricking out boxes enables seedlings to be grown in their own cube of soil, thus reducing the effect of a transplanting check.

2142. Templeton, H. M., Jr.
The electronic leaf.
Amer. Nurserym., 1958, **107**(2): 12-14, 105-18, illus.

Detailed and well illustrated instructions are given, by the inventor of the electronic leaf, on its construction and operation for intermittent mist control, and on recording, checking and adjusting its performance. Special types of electronic leaf are also described which will keep the cuttings less than continuously wet for use in hardening off or in the rooting of mature woody cuttings.

2143. Leiser, A. T.
Polyethylene treatment for tree bark wounds.
Amer. Nurserym., 1958, **107**(9): 13, 49, illus.

It is suggested that wrapping girdled areas of trees in polythene film, to retain water vapour, offers a much better chance of recovery than other treatments if the cambium layer is not destroyed. An example is given of the successful use of polythene wraps on a Chinese elm, completely stripped of bark from the ground to a height of 4½ ft. The wound was not covered for 28 hrs after girdling in June when the weather was warm and dry, but in spite of the delay healing was remarkably complete by October.—Univ. Calif., Los Angeles.

2144. Dionne, L. A., and Spicer, P. B.
Staining germinating pollen and pollen tubes.
Stain Tech., 1958, **33**: 15-17, bibl. 2, illus.

For studies on pollen tube growth in styles of species of *Solanum* none of the standard staining techniques proved entirely satisfactory. A new procedure was developed and is described here, which has given consistently good results when used for staining germinating pollen and pollen tubes in styles of *Solanum* and various other genera, including *Antirrhinum*, *Brassica*, *Oenothera*, *Raphanus*, *Rosa* and *Tagetes*.—Ent. Lab., Fredericton, N.B.

Marketing.

2145. Ministry of Agriculture, London.
National "recommended" grades for home-grown [fruit and vegetables].
Mktg Guides Minist. Agric. Lond. **1** to **38**, 1951 to 1957, pp. 3 to 12, some illus., obable from Minist. Agric. (Publications), Soho Sq., London, W.1.

The following Marketing Guides are available: 1. Strawberries; 2. Plums; 3. Cucumbers; 4. Ripe onions and shallots; 5. Beetroot, parsnips, turnips and swedes; 6. Brussels sprouts; 7. Celery; 8. Carrots; 9. Cabbage greens and cabbages, savoy cabbage and red cabbage; 10. Watercress; 11. Salad onions and green onions and radishes; 12. Rhubarb; 13. Asparagus; 14. Cultivated mushrooms; 15. Globe and Jerusalem artichokes, witloof chicory, horseradish, purple sprouting broccoli and curly kale; 16. Broad beans, kidney beans, and runner beans; 17. Cherries; 18. Raspberries and loganberries; 19. Redcurrants and blackcurrants; 20. Gooseberries; 21. Green peas; 22. Leeks; 23. Endive and batavian endive; 24. Hot-house grapes; 25. Mint, parsley, sage and thyme; 26. Winter and summer cauliflowers; 27. Seakale; 28. Spinach;

29. Marrows; 30. Apples; 31. Pears; 32. Tomatoes [temporarily suspended]; 33. Lettuce; 34. Mustard and cress; 35. Fruit (general); 36. Vegetables (general); 37. Canning grades for vegetables; 38. Sweet corn. The grade requirements are tabulated and notes are given on harvesting, packing and marketing.

Noted.

2146.

a ANGLIN, C., AND MAHON, J. H.
A modified procedure for determining maleic hydrazide residues in plant material.
J. Ass. off. agric. Chem. Wash., 1958, **41**: 177-82, bibl. 1, illus.
With data on residues found in apples, vegetables and tobacco.

b ANON.
Prepacking fruit and vegetables: containers and films.
Mon. agric. Rep. Minist. Agric. Belfast, 1958, **33**: 7-11.
Pros and cons are discussed.

c ANON.
This new Dutch stabiliser lays the dust.
Comm. Gr, 1958, No. 3253, p. 1037, illus.
A starch-based compound (Stabilose) to control wind erosion.

d BARTON, L. V., AND FINE, J. M.
Noninterference between effects of gibberellic acid and fungicides.
Contr. Boyce Thompson Inst., 1958, **19**: 291-4, bibl. 5.
A fuller account of *H.A.*, 27: 3059.

e BOULD, C.
Horticulture.
Rep. Progr. appl. Chem. Lond., 1956, **41**: 525-34, bibl. 51.
A review of recent work on plant nutrition.

f BRIAN, P. W.
Role of gibberellin-like hormones in regulation of plant growth and flowering.
Nature, 1958, **181**: 1122-3, bibl. 29.

g BROOKLYN BOTANIC GARDEN.
An inexpensive greenhouse heating system.
Plants and Gdns, 1957-58, **13**: 254-7, illus.
Adaptation of a domestic electric heater for use in a cool greenhouse.

h BROWN, H. C.
Values of soil heating.
Amer. Nurserym., 1958, **107**(7): 120-4.
Uses and electrical equipment discussed.

i ČAJLAHJAN, M. H.
Chemical growth stimulants and flowering. [Russian.]
Priroda, 1958, **47**(1): 99-102, bibl. 12, illus.
A review with particular reference to recent work with gibberellin and gibberellic acid.

j CHOUARD, P.
Les gibberellines—nouveaux facteurs de croissance des plantes à fleurs. **(Gibberellins—new factors in the growth of ornamental plants.)**
Rev. hort. Paris, 1958, **130**: 1793-803, bibl. 6, illus.
A review, with additional details of experimental work at the Gif-sur-Yvette research centre.

k COHEN, D., GINZBURG, B-Z., AND HEITNER-WIRGUIN, C.
Metal-chelating properties of plant-growth substances.
Nature, 1958, **181**: 686-7, bibl. 9.
Studies on IAA and NAA.

l DIKSHIT, N. N.
Parthenocarpy in some fruit plants. Part II. Review of literature on parthenocarpy induced by growth substances and its effects on fruits and plants.
Mysore agric. J., 1957, **32**: 162-78, bibl. 122.
Chemicals, their application and effects on various plants. [See also *H.A.*, 27: 3225.]

m FOREST, B.
Les effets physiologiques de l'acide gibberellique sur la croissance des plantes. **(The physiological effects of gibberellic acid on the growth of plants.)**
Agriculture, Québec, 1958, **15**: 14-16, bibl. 21.
A review.

n GLUŠČENKO, I. E.
Development of work on vegetative hybridization. [Russian.]
Agrobiologija, 1957, No. 5, pp. 106-18.
Discussing evidence for and against vegetative hybridization, the author tries to prove the validity of the theory.

o GOULDEN, C. H., AND MASON, W. J.
An electronic seed counter.
Canad. J. Plant Sci., 1958, **38**: 84-7, illus.
Combining reasonable cost with speed and accuracy, for seeds in the size range from flax to barley.

p HONDELMANN, W.
Was ist und wie wirkt Gibberellin? **(What is gibberellin and how does it work?)**
Dtsch. Baumsch., 1958, **10**: 75-80, bibl. 37.
A review, including responses of trees and shrubs.

q HUTCHINSON, A., ROY, C., AND TOWERS, G. H. N.
Synthesis of phlorin and other phenolic glucosides by plant tissues.
Nature, 1958, **181**: 841-2, bibl. 14.
In *Malus*, *Adiantum*, *Pelargonium*, *Kalanchoë* and *Gerbera* species.

r International Commission for the Nomenclature of Cultivated Plants.
International code of nomenclature for cultivated plants.
Publ. int. Union biol. Sci., Utrecht, 1958, pp. 28, being *Regnum vegetabile*, Vol. **10**. Obtainable from R.H.S., Vincent Square, London, S.W.1.

s Lang, A.
Stem elongation in a rosette plant, induced by gibberellic acid.
Naturwissenschaften, 1956, **43**: 257-8, bibl. 10, illus. [received 1958].
Hyoscyamus niger. [See also *H.A.*, 26: 3271 and 27: 3051.]

t Laske, P.
Torf im Gartenbau. **(Peat in horticulture.)**
Saatgut-Wirtsch., 1958, **10**: 75-7, 107-8.
Its effect on the soil and its role in plant nutrition.

u Levisohn, I.
Effects of mycorrhiza on tree growth.
Soils and Ferts, 1958, **21**: 73-82, bibl. 75.
A review, concerned mainly with conifers, but including work on oak, eucalyptus and [see *H.A.*, 27: 2125] apple.

v McKillop, A. A., Morris, L. L., and Barger, W. R.
Thermostatic control for fresh perishables in ice-refrigerated railroad cars.
Reprinted from *Industr. Refrig.*, November 1957, pp. 5, bibl. 3, illus.
Temperature control to prevent chilling injury.

w Merck & Co., Inc., Chemical Division.
Gibrel. A progress report.
Publ. Merck & Co., Inc., Chemical Division, Rahway, New Jersey, 1957, pp. 15.
Recommendations for application of the potassium salt of gibberellic acid.

x Ministry of Agriculture, London.
The design and cropping of mobile glasshouses.
Adv. Leafl. Minist. Agric., Lond. **465**, revised 1957, pp. 7, illus.

y Narvestad, K.
Arbeidsregnskap i gartneriene. **(Labour accounting in horticulture.)**
Gartneryrket, 1958, **48**: 246-8.
From the Institute of Management and Agricultural Economy, Norwegian College of Agriculture.

z Page, A. B. P., and Blackith, R. E.
Developments in fumigation practice.
Rep. Progr. appl. Chem. Lond., 1956, **41**: 535-45, bibl. 51.
A review, dealing with seeds, stored products, fruits and plants.

2147.

a Pilet, P. E.
À la découverte des gibberellines. **(The discovery of gibberellins.)**
Rev. hort. suisse, 1958, **31**: 116-22, bibl. 4, illus.
A review.

b Plant Protection Ltd.
Gibberellic acid. Bibliography.
[*Publ.*] *Plant Protection Ltd., Fernhurst Res. Stat., Haslemere, Surrey*, 1957, pp. 40.
Covers publications up to the end of Aug. 1957. [See also *H.A.*, 28: 29.]

c Sax, K.
The juvenile characters of trees and shrubs.
Arnoldia, 1958, **18**: 1-6, illus.
A discussion, with examples taken from fruit trees and ornamentals.

d Schoorel, A. F.
De invloed van extreme temperaturen en van uitdroging op de kiemkracht van zaden. **(The effect of temperature extremes and drying out on seed viability.)**
Landbouwk. Tijdschr., 1958, **70**: 117-22, bibl. 24.
A brief review.

e Siegelman, H. W., and Hendricks, S. B.
Photocontrol of anthocyanin formation in turnip and red cabbage seedlings.
Plant Physiol., 1957, **32**: 393-8, bibl. 21.
Wavelength at which maximum synthesis occurs and discussion of possible nature of photoreceptors.

f Solberg, R. A., and Higinbotham, N.
The effects of indoleacetic acid, sucrose, and eugenol on differentiation in segments of etiolated pea epicotyls.
Amer. J. Bot., 1957, **44**: 769-78, bibl. 17, illus.

g Steward, F. C., and others.
The effects of selected nitrogen compounds on the growth of plant tissue cultures.
Biochim. biophys. Acta, 1958, **28**: 308-17, bibl. 17.
Studied on carrot root tissue cultures.

h Wager, H. G.
The determination of ethanol and acetaldehyde in plant tissue by low-temperature diffusion.
Analyst, 1958, **83**: 291-5, bibl. 8.
With examples of contents found in mature and old peas, both wilted and unwilted.

i Wright, G. M.
The estimation of missing values in factorial experiments.
N.Z. J. Sci.,* 1958, **1**: 1-8, bibl. 7.

j Zeevaart, J. A. D.
Produktie, fysiologische werking en mogelijkheden voor toepassing van een nieuwe groep stoffen: de gibberellienen. **(The production, physiological action and possible uses of a new group of chemicals: the gibberellins.)**
Landbouwk. Tijdschr., 1958, **70**: 123-35, bibl. 43.
A review.

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* Formerly *N.Z.J. Sci., Sect. B.*

TREE FRUITS, DECIDUOUS.

General.

(*See also* 2238f, j, k, n, x, 2239c, h, j, n, 2841. 3192, 3206, 3207, 3215, 3221, 3226e.)

2148. COUTANCEAU, M., AND OTHERS.
Les journées fruitières et maraîchères d'Avignon 1958. (**Fruit growing and market gardening days at Avignon 1958.**)
Arboric. fruit., 1958, No. **49**, pp. 1-21.

Summaries are presented of papers given at a conference held under the *Direction départementale des Services agricoles du Vaucluse* in January 1958. Papers were given on the following subjects: The development of apple growing, French dessert apple production, The position of the codling moth amongst fruit pests in the Rhône valley, Apple rootstock selections developed at East Malling, The principal viruses of apples and other pome fruits, Cold storage of apples, The fruit fly in the Rhône Valley, The nutritional and curative value of the apple, Development of apple growing in Italy, Apple juice production.

2149. COMITÉ NATIONAL POUR L'ÉTUDE DE LA CULTURE FRUITIÈRE, I.R.S.I.A.
Rapport Succinct, Comité National pour l'Étude de la Culture Fruitière, Déc. 1956-Déc. 1957. (**Short Report** [Belgian] **National Committee for the Study of Fruit Growing, December 1956-December 1957**), pp. 57.

Work at Gembloux, Gontrode and Gorsem is briefly summarized in French or Flemish. *Soil studies:* cover crops, mulches and windbreaks for pears. *Manurial studies:* field experiments with increasing applications of fertilizer applied broadcast or by injection; pot experiments on plant requirements of NPK and also S, Ca and Mg; fertilizer distribution in the plant studied by isotopes (P, Ca, Fe and S); laboratory analyses on the relations between plant mineral composition and storage, soil management and mineral deficiencies. *Varietal studies:* soil/stock/scion relationships in apple, pear and plum trees; cytological studies on chromosome numbers, pollen counts, artificial and natural pollination, embryo culture and colchicine application. *Cultural studies:* pruning, thinning by chemicals. The report from Gorsem includes notes on pest and disease control, improving fruit colour, russeting and Jonathan breakdown.

2150. BOWMAN, F. T.
Horticultural Research Record No. 2.
[*Publ.*] *N.S.W. Dep. Agric. Div. Hort.*, 1957, pp. 59.

Fruit investigations carried out by the Division are reviewed up to January 1957, the projects in the main being different from those reported in Record No. 1 [see *H.A.*, 27: 1086]. The headings are as follows: *Permanent plantings. Apple:* rootstock trials; pruning trials. *Pear:* rootstock trials; pruning trials. *Citrus:* rootstock trials. *Vine:* breeding and variety trials; spacing; intervarietal affinity; *Phylloxera*-resistant strains. *Passion fruit:* variety trials. *Tropical fruits:* variety collection; banana spacing; banana contour planting. *Annual and recurrent experiments. Hormone and foliar sprays:* for thinning plums, peaches and apples; for hastening maturity of apples, citrus and bananas; to improve grape fruit set; to prevent preharvest drop of citrus; to destroy uneconomical banana plantations. *Pollination studies:* with olives, passion fruit and grapes. *Propagation:* use of plastic materials. *Fertilizers:* superphosphate for citrus quality; manures for vines. *Irrigation:* automatic soil moisture indicators for citrus; supplementary irrigation for bananas. *Plastic bunch covers for bananas. Waxing of bananas.*

2151. STURM, M.
Strahlungsökologische Untersuchungen in Obstkulturen. (**Studies on the light environment of fruit trees.**)
Gartenbauwiss., 1957, **22**: 417-40, bibl. 20, illus.

Light penetration has been studied in young apple trees of 3 varieties with different types of crown. Within the crown of Klarapfel light intensity was seldom more than 30% of that in the open, and 5–6% of the total leaves were shade leaves. In direct sunlight light intensity in Boskoop crowns was 97% of that in the open, while under shaded conditions it was about 40%; shade leaves amounted to 0·5% of the total. There were no shade leaves in Edelborsdorfer crowns, where light intensity was 60–90% of that in the open. On dull days varietal differences in light intensities within the crown and in the open were less marked than on sunny days. Light intensities were also affected by sector aspect, the greatest differences between sectors after growth had finished occurring in Boskoop and the smallest in Edelborsdorfer. Average light intensities with direct sunlight were higher at a crown height of 2 m. than at 1·6 m. During the period of leaf and shoot growth more light (20–27%) in relation to light in the open was available within tree crowns on days with diffuse light than with direct sunlight. Light penetration was reduced as growth progressed. Varietal differences in leaf transparency were apparent. It is concluded that intercrops should not be grown under dwarf trees more than 3 years old, nor under standard trees more than 8-9 years old.—Inst. Obstb., Bonn.

2152. HOBLYN, T. N.
Practical aspects of field experimentation with fruit.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 43-7.

Some of the non-statistical considerations that should be taken into account in the planning of field investigations with fruit plants are described in the light of the land available and the time at the disposal of each research worker. The difference between assessment trials and directive experiments is pointed out and the need for care in the selection of plant material and, subsequently, in the plantation emphasized. [Author's summary.]

2153. JOLLY, G. M., AND HOLLAND, D. A.
Sampling methods for the measurement of extension growth of apple trees.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 87-90, bibl. 3.

Two methods of sampling extension growth on apple trees are described. One method, designated Systematic Shoot Sampling, is suitable for use when a high degree of accuracy is required. An average of 20 to 25 shoots, selected in the prescribed manner, should be measured on each tree, more if the trees vary much in size. The other method, Random Branch Sampling, should be used when the trees are of such a size as to require the use of ladders for their measurement and if some loss in accuracy can be tolerated. On young trees of not more than 3 years old a complete recording will usually be necessary. Individual measurements should be made to the nearest decimetre. [Authors' summary.]

2154. FREEMAN, G. H.
A comparison of methods of measuring leaf areas in the field.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 83-6, bibl. 6.

Various methods for obtaining the areas of elliptically shaped leaves in the field are compared. Experiments on apple plants are discussed which show that a direct-reading grid is more rapid and no less accurate than the method of counting squares and is not subject to bias due to different observers, varieties or age of leaves. Consideration is also given to the reduction of errors in sampling whole plants, the most important point here being the correct assessment of the fraction of the leaves on the plant to be measured. The application of this grid, or others, to leaves of other species is also discussed. [Author's summary.]

2155. SHEN, C., AND ČŽAN, Ž.
Peach tree growing. [Chinese.]
Še̊n-usjue̊ Tunbao, 1956, No. 9, pp. 12-17, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,521.

The most popular peach varieties and important production areas in China are given. Peach trees are resistant to heat but are damaged at −23 to −25° C. Sandy soils are the most suitable, but on soils with a high lime content (pH 7·7–8) they suffer from chlorosis. In northern China *Prunus davidiana* and in southern China *P. persica* are used as rootstocks. Basic fertilizers, applied in the autumn, are organics with the addition of N and K. The first top dressing is applied 2–3 weeks before flowering, the second before flower bud differentiation and the third (for late varieties) at growth cessation (end of August). Irrigation is carried out at the time of flower bud differentiation and stone formation, and also during spring or autumn drought. Fruit thinning is widely practised.

2156. BAHODYROV, M.
The use of saline soils for mulberry cultivation. [Russian.]
Tr. Taškentsk. s.-h. In-ta, 1956, No. 7, pp. 77-86, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,446.

Results are given of trials on mulberry growing on saline soils in Central Asia. Salinity retarded seed germination and early growth, after which the trees became more resistant. In seedbeds the plants endured up to 0·3% salt content when flood irrigated, and in the nursery up to 1% without and up to 2% with irrigation. All the varieties tested were equally susceptible to salinity.

Varieties and breeding.

(*See also* 2238m, p, 2239b, d, g, l, p.)

2157. TYDEMAN, H. M.
The breeding of late flowering apple varieties.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 68-73, bibl. 1.

Breeding work, initiated in 1950 to produce late flowering apple varieties of commercial value, is described. Seedlings from a large number of crosses, mostly between Cox's Orange and late flowering varieties, as well as from self-pollinations, have been classified and selected on their time of leaf break in the spring, a character shown to be correlated with season of flowering. Those late leafers showing resistance to apple mildew and apple scab have been retained for further observation and selection on flower and fruit characters. [Author's summary.]

2158. KEEP, E.
Cytological notes.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 75-8, bibl. 15, illus.

Cytological data are briefly presented on a sport of Laxton's Superb apple, on plum and cherry rootstocks and other *Prunus* species, and on interspecific *Rubus* and *Ribes* hybrids. The apple sport, represented by several trees in a trial, is characterized by outstanding vigour, poor and irregular cropping and large, misshapen fruit. It proved to be a periclinal chimaera with meristems consisting of a diploid epidermis surrounding a core of tetraploid tissue, whereas the normal Laxton's Superb is diploid. Growth characters which assist in the recognition of such undesirable sports are discussed.

2159. VYSOCKIJ, A. A.
Local pear varieties as material for selection. [Russian.]
Priroda, 1958, **47**(2): 108-10, bibl. 2, illus.

The age-old Trubčevsk group of pears are hardy, heavy and annual bearers, and could also be used for selection of rootstocks.

2160. FOGLE, H. W., AND OTHERS.
Fresh-market and canning characteristics of twelve apricot varieties.
Proc. Wash. St. hort. Ass., 1957, pp. 169-71, bibl. 2.

Blenheim, Earliril, Blenril, Tilton, Sun-glo and Perfection were most suitable for canning. Earliril and Blenril have desirable firmness, texture and flavour, and their dull skins can be lye-peeled before canning. —Irrigation Exp. Stat., and U.S. Fruit Veg. Prod. Lab., Prosser, Wash.

2161. SHARPE, R. H.
Okinawa peach shows promising resistance to root-knot nematodes.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 320-2.

Seedlings introduced from Okinawa are highly resistant to *Meloidogyne incognita*, *M. incognita acrita* and *M. javanica*; they are, however, susceptible to mushroom root rot [*Armillaria mellea*]. Good stands have been obtained in the nursery, and so far compatibility has been good.—Fla agric. Exp. Stat., Gainesville.

2162. Werneck, H. L.
Die Formenkreise der bodenständigen Pflaumen in Oberösterreich. Ihre Bedeutung für die Systematik und die Wirtschaft der Gegenwart. **(The range of subspecies and varieties of indigenous plums in Upper Austria, their present significance in systematics and economics.)** [English, French and Spanish summaries 8 or 10 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 59-82, bibl. 17.

Indigenous plum varieties of Upper Austria have been observed and classified. Several types were found to be vigorous and winter-hardy, and may be of value for breeding purposes. The fruit is of value for distillation.

Propagation and rootstocks.

(*See also* 2238g, i, w, y, 2239a, e.)

2163. Garner, R. J., and Hatcher, E. S. J.
Aspects of rootstock propagation. V. The behaviour of root cuttings from plants of different age of establishment.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 57-61, bibl. 11, illus.

The behaviour of root cuttings of the apple clone Crab C taken from source plants of five ages was compared in three successive seasons. Rooting and the growth of root cuttings both declined with increasing age of establishment of the parent plant. The effect of cutting size, within the limits compared of 6 to 10 mm. diameter, was only moderate, with thick cuttings having the better chance of survival; but, once established, thin cuttings grew better. The decline in rooting with age in the clone bears close resemblance to that found in seedlings, suggesting that root tissue when first initiated may have something of the quality of juvenility. The implications of this possibility are discussed. For nursery purposes 3- or 4-year parents provide cuttings adequate both in quantity and regenerative quality. [Authors' summary. For part IV see *H.A.*, 27: 2104.]

2164. Rogers, W. S.
Malling 26, a new semi-dwarfing apple rootstock.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 48-9, bibl. 4, illus.

M.26 was raised from a cross made between M.XVI and M.IX in 1929. When worked with Cox's Orange Pippin and several other varieties it produces trees intermediate in vigour between those worked on M.IX and M.VII. Notes are here provided on its root structure and anchorage, its comparative freedom from suckering, and the yields obtained from Cox worked on it. It propagates well from stools and can also be raised from hardwood cuttings. It is free from rubbery wood and mosaic viruses and shows moderately good resistance to mildew and collar rot.

2165. Lugeon, A.
Étude des rendements comparatifs sur différents porte-greffes de pommiers. **(Comparative yields on various apple rootstocks.)**
Rev. hort. suisse, 1958, **31**: 150-3, illus.

Preliminary results show that on all stocks tested initial yields from Golden Delicious are higher than those of Jonathan or Cox. With Golden Delicious the most vigorous stock (M.XVI) also induces the heaviest cropping. Differences between rootstocks are less marked with Jonathan.

2166. Karnatz, H.
Über das Verhalten der neuen englischen Apfelunterlagen (MM=Typen) im Mutterbeet. **(On the behaviour of the new English (MM) apple rootstocks in the stoolbed.)**
Mitt. ObstbVersuchsringes Jork, 1958, **13**: 142-4, bibl. 4.

The following rootstocks were tested: MM 104, 106, 109, 111, EM XXV and Crab C. With the exception of the last, rooting was good, but the number of rooted shoots produced was too low. There are also other reasons why these stocks show little promise for Western Germany, where woolly aphid resistance of the roots is no advantage.

2167. Schulz, F.
Der Einfluss der Zwischenveredlung auf die Entwicklung der Apfelsorte Berlepsch. **(The effect of interstock on the development of the Berlepsch apple variety.)** [English, French and Spanish summaries 5 or 6 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 82-7, bibl. 2, illus.

Preliminary tests with interstocks for Berlepsch have given promising results. The greatest effect on growth was observed with interstocks of M.IX, which retarded growth, advanced fruiting and resulted in higher yields in the early years. Those of M.II and Klarapfel also modified growth.—Inst. Obstb., Berlin.

2168. Zaec, V. K., and Ivanova, Z. I.
Some methods of influencing the development of hybrid apple seedlings. [Russian.]
Agrobiologija, 1957, No. 6, pp. 120-1.

The results of 2 experiments at Mičurinsk are briefly described. In the first 2-year-old hybrid seedlings "budded on themselves" produced a higher percentage of cultivated types than those grown on their own roots. In the second a high level of cultural practices, i.e. manuring, mulching, weed control, gave similar results producing a larger number of promising seedlings than less favourable growing conditions.

2169. Kušnirenko, M. D., and Štin, E. T.
Studies on the influence of the mentor on the formation of hybrid seedlings in relation to the position of the grafts in the crown. [Russian, with English summary ¼ p.]
Fiziol. Rast., 1958, **5**: 42-50, bibl. 22.

The morphological and physiological characteristics of various parts of the crown of fruit trees differ and these differences affect grafts. The water economy in the leaves of apple and pear hybrid scions grafted on the upper branches of trees was more restricted than that of scions grafted on the lower branches and resembled that of the upper branches of the mentor; the grafts formed more xeromorphic leaves, which showed a reduced rate of transpiration due to increases in the amount of bound water and osmotic pressure. The leaves of the upper branches of the mentor and of the scion grafted at the same level were found to be more drought resistant and showed a much lower rate of transpiration during the warmest part of the day than those of the other branches.

2170. Smith, D.
New techniques make peaches a proposition.
Grower, 1958, **49**: 1060-2, illus.

At John Innes stoolbed propagation of a 6-year-old seedling peach has given promising results as a means of establishing clonal material on its own roots. Scions in general united successfully in topworking and frameworking young fruiting bushes. With frameworking there was a tendency for scions along the limbs to fail, so that a bare area developed in the centre of the tree.

2171. Sokolov, A. K.
Variations in the rooting capacity of fig shoots. [Russian.]
Agrobiologija, 1957, No. 6, pp. 141-3, illus.

Transplants with the most vigorous root systems were found to be produced by cuttings taken in the spring from the centre of shoots from the lower part of the crown.

Growth.

(*See also* 2073, 2147c, 2238d, z.)

2172. Schander, H.
Beobachtungen über die Variabilität des Blattes beim Apfel. (**Observations on leaf variability in apple.**)
Reprinted from *Z. Bot.*, 1958, **46**: 75-84, bibl. 6, illus.

Variations in size and form have been studied in seedlings and in young budded apple trees. It is concluded that typical leaves occur in the middle of an upright vegetative shoot. Variations in size and form increased towards the shoot tip and base, and were also apparent in axillary leaves of older shoots and in leaves of fruit spurs.—ObstbVersuchsanst., Jork.

2173. Hancock, C. R., and Barlow, H. W. B.
Seasonal fluctuations in stem growth in the apple rootstock Crab C.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 91-5, bibl. 5.

Measurement of shoot growth in Crab C rootstocks made in 3 years showed differences between the years and considerable fluctuations within each season. Fluctuations in the rate of growth, both in terms of length of shoot per day and in the number of internodes produced per day, were largely accounted for by variations in temperature (accumulated day degrees above 42° F.) and day length. However, temperature had less effect, and day length almost no effect, on the final length attained by the internodes.

2174. Maggs, D. H.
A comparison of the growth patterns of two apple rootstock varieties during their first year.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 101-5, bibl. 6.

Rooted layers of the apple rootstock varieties M.II and M.XVI (of average and late natural budbreak) were made to break into growth over a period from early March to mid-June. Extension growth and leaf number were measured during the growing season and dry weights determined at the end of September. The time trends of stem elongation, leaf number, leaf area and of dry weight 70–190 days after bud-break were linear and the same for both varieties, and the dry weights of plants having the same growing periods did not differ significantly. The varieties differed in the proportion of stem and root, M.II developing more stem and M.XVI more root for plants of the same weight. The average increase in weight per g. leaf was lower for M.II than for M.XVI. It is suggested that this is due to the larger "sink" [reservoir of tissue capable of utilizing metabolites] afforded by the greater cambial surface of the root system of M.XVI, and a mode of action of rootstock effect is adumbrated in these terms. [Author's summary.]

2175. Rudloff, C. F., and Feucht, W.
Funktionelle Tendenzen der reproduktiven Organe des Apfels. 2. Lebensalter und Reproduktivität. (**Functional tendencies of the reproductive organs in apple. 2. Age and reproduction.**) [English, French and Spanish summaries 7 to 9 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 21-33, bibl. 18.

In Golden Delicious, Champagner Renette and Goldparmäne the inflorescences of young trees flowering for the first time showed a marked vegetative tendency, compared with those of more mature trees. The effect was most marked in Champagner Renette, which had the most vigorous shoots and largest leaves, and least in Goldparmäne. [For part 1 see *H.A.*, 28: 118.]—Inst. Obst- u. Gemüseb., Stuttgart.

2176. Feucht, W.
Funktionelle Tendenzen der reproduktiven Organe bei der Mispel (*Mespilus germanica*) und Quitte (*Cydonia oblonga*). (**Functional tendencies of the reproductive organs in medlar and quince.**)
Gartenbauwiss., 1957, **22**: 441-8, bibl. 9.

Early and late-flowering shoots of medlar and quince were studied. In medlar both vegetative and reproductive portions of the shoot were inhibited in the late-flowering shoots. The inhibition appeared as shortening of the shoot and reduction in leaf surface and in the floral parts, except for carpel number which remained constant. In quince vegetative growth of late-flowering shoots was promoted so that shoots were longer and leaf numbers were reduced, while perianth area and stamen number were increased. During the post-floral stage in medlar the growth inhibition continued, as indicated by a reduction in fruiting ability and lower fruit weights. Flower initiation of later-flowering shoots occurs about 5 days after that of earlier-flowering shoots. The morphologic form of the flowering shoots is considered to be influenced by the degree of apical dominance, which is more marked in medlar than in quince.—Inst. Obst- u. Gemüseb., Hohenheim.

2177. Vuorinen, J.
Omenapuun juuristosta. (**Apple tree root systems.**) [English summary ¾ p.]
Maataloust. Aikakaus., 1958, **30**: 41-57, bibl. 16, illus.

In young trees the root system spreads relatively faster than the crown and may extend 1–1·5 m. beyond it. A rooting depth of 40–50 cm. in young trees may increase with age up to 1 m. in favourable soil, but not in heavy clay. In sandy soil the deeper roots spread horizontally just above the dry subsoil. Clean cultivation maintains an upper rootless layer 5–20 cm. in depth, but sod and mulch encourage superficial root development.

2178. Coker, E. G.
Root studies. XII. Root systems of apple on Malling rootstocks on five soil series.
J. hort. Sci., 1958, **33**: 71-9, bibl. 10, illus.

The root systems of 15 mature Cox's Orange Pippins on M.I, II or IX were excavated in 5 soil series in Kent. Soils A and B were deep, freely-draining profiles over chalk, and soils C, D and E (under grass) were less deep, with an impedance to drainage in the underlying layers. Root development was similar to that already described for related soils. Trees on M.I on plots C, D and E over the Hastings beds had a wider branch spread in relation to root spread than trees on plots A and B over chalk. The ratio of branch spread to root spread was higher for M.II than for M.I or M.IX on all plots except E, where there was little difference. On all plots trees on M.I had a substantially greater area of root spread than trees on M.II or M.IX. On A and B root penetration below 1 m. was greater in M.II than in M.I. On C, D and E root penetration was limited. It was concluded that the larger size of trees on M.II, compared with those on M.I, on A and B was related to the greater amount of deep roots formed by M.II. On plots A and B the area of root spread and tree size on M.IX were more than 50% less than for comparable trees on plots C, D and E.—E. Malling Res. Stat.

2179. Kušnirenko, M. D., and Denisov, V. F.
Accumulation of storage materials during the ripening of apple seeds in relation to the position of the fruit in the crown of the tree. [Russian.]
Bjul. nauč.-tehn. Inform. Centr. genet. Labor. im I.V. Mičurina, 1956, No. 2, pp. 33-7, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,319.

The process of ripening in apple seeds of fruit at different heights in the crown was studied, and it was found that conditions in the upper branches promoted better seed formation and 12–15 days earlier ripening than those in the lower branches.

2180. Tutajuk, V. H., and Agaev, Ju. M.
The behaviour of green plastids in the fruiting and vegetative shoots of some fruit trees in a dry subtropical climate. [Azerbajdžan, with Russian summary.]
Izv. AN AzSSR, 1956, No. 5, pp. 57-83, bibl. 27, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 89,857.

The condition of green plastids was studied in apple, pear and apricot shoots at 15–20-day intervals throughout the year. In the autumn agglutination set in—the green plastids lost their normal shape and combined with the rest of the protoplasm forming a green mass in the cell. In the spring bright green spots, rich in chlorophyll, separated from this mass and differentiated into plastids in which starch began to accumulate. Under Leningrad conditions during agglutination the starch grains were hydrolysed, while in southern latitudes they were preserved. Agglutination and deglutination started earlier in the south than in the north. The vegetative shoots contained less starch than the fruiting shoots. Agglutination proceeded in the fruiting shoots during flowering, and from the agglutinized mass of phellodermal cells green plastids were formed.

2181. Pirovano, A.
Reversioni e fluttuazioni di caratteri nel pero. **(Reversions and fluctuations in the characteristics of pears.)**
Riv. Ortoflorofruttic. ital., 1958, **42**: 3-6, illus.

A young tree of the Beurré Clairgeau pear grafted on quince sent out a spiny branch after growing normally for 4 years. This is the first record of reversion to juvenility in the variety, which has been established for a century. A new stable fruit form, ovoid instead of spherical, is reported in the variety Fragrante (Bergamotte Esperen × Passe Crassane). A branch of Tarda (Duchesse d'Angoulême × Passe Crassane) bore both glossy and russet fruit, the latter not being attributable to copper fungicides.

2182. Singh, U. P.
Determination of the reproductive flushes and their behaviour in loquat (*Eriobotrya japonica* Lindl.).
Hort. Advance, 1957, **1**: 58-61, bibl. 7.

Flowering continued from September to February, the number of inflorescences declining but the percentage of fruit set increasing as the season advanced. Fruit size was inversely proportional to number per panicle. Removal of panicles until after November increased number of fruit per panicle and weight of fruits in later months, but panicles were fewer and total yield was less.—Hort. Res. Inst., Saharanpur, U.P.

Pollination.

(*See also* 2238b, v, 2239o.)

2183. Ostapenko, V. I.
An evaluation of different methods of determining pollen viability. [Russian.]
Bjul. nauč-tehn. Inform. Centr. genet. Labor. im. I.V. Mičurina, 1956, No. 2, pp. 38-41, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,300.

The viability of apple, pear, apricot, peach, plum, damson and almond pollen after 10–15 days' and 12 months' storage was tested in the laboratory by the following 3 methods: germination on 10% sugar solution, staining with aceto-carmine and peroxidase determination. The results showed that germination on sugar solution gave a reasonable indication of viability while the other 2 techniques were unsuitable for old pollen.

2184. Oberle, G. D., and Moore, R. C.
Hand pollination in Virginia apple orchards.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 189-90.

Pollination by hand was compared with pollination by bees plus cut pollinator branches in Starking trees. Heavy crops of fruit were produced by both methods, but in practice the labour requirements may be too high.

2185. Townsend, G. F., Riddell, R. T., and Smith, M. V.
The use of pollen inserts for tree fruit pollination.
Canad. J. Plant Sci., 1958, **38**: 39-44, bibl. 10, illus.

Tests conducted in the Niagara and Georgian Bay fruit-growing areas for the past 3 years [in cherry, apple and pear orchards] have indicated that pollen distributed from inserts placed at the entrances of honeybee colonies is effective as a means of cross-pollinating tree fruits. This technique is particularly useful in seasons when honeybee foraging activities are limited by unfavourable weather, or in plantings where a sufficient number of pollinator varieties for natural cross-pollination have not been provided. [Authors' abstract.]—Ont. agric. Coll., Guelph.

2186. Johansen, C., and Degman, E.
Progress report on hive inserts for apple pollination.
Proc. Wash. St. hort. Ass., 1957, pp. 77-80, bibl. 9, illus.

Experiments showed that pollen diluted with lycopodium spores agitated the bees and was unsuitable for use in inserts. Inserts in which the bees pass through the pollen trough in leaving the hive were most suitable. Fair fruit set was obtained by using pollen inserts; these should be hourly replenished, the stored pollen being refrigerated. Pollen from hive inserts was carried up to 135 yards into an orchard, but bees did not carry insert pollen into the hive and store it.

2187. de Mos, D.
Wat doen we tijdens de bloei van de kaspruimen? **(What do we do during flowering of plums under glass?)**
Fruitteelt, 1958, **48**: 300-1, illus.

Experiments at Naaldwijk have shown that pollen germination of Golden Japan and Formosa was at its lowest at full bloom but increased up to petal fall. Santa Rosa and Beauty pollen germinates well at the time of full bloom. It is concluded that it is unnecessary to start pollination as soon as the flowers open.

Soil management and irrigation.

2188. Boynton, D., and Magness, J. R.
Soil management in orchards.
Soil, being *Yearb. Agric. U.S. Dep. Agric., 1957*, pp. 699-710.

Apple, pear, cherry, peach, apricot, walnut, pecan, filbert, almond, chestnut, raspberry, strawberry, blackberry, blueberry, cranberry, vine, date palm, fig, citrus fruits, olive and tung.

2189. Miles, H. W.
Problems of establishing orchards in grass.
Agric. Rev., 1958, **3**(11): 30-5, illus.

An experiment at Wye College is described in which grassing down of young trees in the year of planting was compared with clean cultivation. First results show that growth of the trees in cultivated plots is more vigorous, but that the trees in grassed plots are fruiting and forming fruit spurs more freely.

2190. Proebsting, E. L., Jr.
Effect of cover crop and nitrogen level on Elberta peach production following 1957 freeze.
Proc. Wash. St. hort. Ass., 1957, pp. 89-90.

Trees with heavy N applications, up to 2 lb./tree, with orchard grass and mulch management, and in which the crop had been thinned early in the previous season, yielded most heavily after severe frost damage.—Irrigation Exp. Stat., Prosser, Wash.

2191. Till, M. R.
Progress report on apricot irrigation and nitrogen trial.
J. Dep. Agric. S. Aust., 1958, **61**: 295-7.

Frequent, one or no irrigation, with or without sulphate of ammonia applications in spring, was applied to trees of 3 apricot varieties. N fertilization increased total yield and fruit weight, but did not affect tree size. Tree size and yield were increased by frequent irrigation as compared with one or no irrigation. The highest yields were obtained from high N plus high irrigation treatments.

2192. Forshey, C. G.
Irrigating New York orchards.
Proc. N.Y. St. hort. Soc., 1958, pp. 90-4.

All irrigation treatments applied significantly increased fruit size in Golden Delicious. June drop was reduced or stopped by the first application of irrigation in mid-June, so that irrigation significantly increased fruit number per tree. The application of 12 in. of irrigation water between June and October increased yields by 75%. It is recommended that soil moisture should be maintained at 25% available soil moisture at a depth of 12 in.

2193. Middleton, J. E.
Water use measured.
West. Fruit Gr, 1958, **12**(4): 16.
Irrigating orchards according to need.
Proc. Wash. St. hort. Ass., 1957, pp. 162-4.

Evaporation records showed high correlation of consumptive use between two apple orchards in central Washington and between soil moisture and evaporation from pans. During April and May water use was low and it was not necessary to irrigate until grass and tree foliage had depleted the reserves of soil moisture accumulated during winter.—Irrigation Exp. Stat., Prosser.

2194. Semaš, D.
Some characteristics of soil moisture uptake in orchards in the south of the Ukrainian S.S.R.
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **23**(1): 29-33.

Determinations were made on the uptake of soil moisture in the rhizosphere of fruit trees at various depths and distances from the trunk. The relationship between the differences noted and the species, variety and condition of the trees was studied in order to improve irrigation practices.

Nutrition.

(*See also* 2068, 2093, 2130, 2238c, h, q.)

2195. Dalbro, S., and Nielsen, G.
Undersøgelser over jordens nitratindhold i frugtplantager. **(Studies on the nitrate content of orchard soils.)** [English summary 1½ pp.]
Tidsskr. Planteavl, 1958, **62**: 1-25, bibl. 18.

Graphs [with captions in English] illustrate the effect of soil management on the nitrate content of apple orchard soils at various depths as well as the relationships between the soil nitrate status and soil temperature and soil moisture respectively. It is suggested that information be obtained on the following points: The depth to which apple trees can utilize nitrate; the seasons at which nitrate uptake takes place; and the level of soil nitrate required to supply the trees with desirable quantities of nitrogen.—Blangstedgaard 1954–55.

2196. Yamazaki, T., and Mori, H.
Studies on the nitrogen nutrition of apple trees in water culture. I. The influences of nitrogen intermission treatment on the growth and nutrient absorption of non-bearing apple trees. [Japanese, with English summary ½ p.]
Reps Tohoku nat. agric. Exp. Stat., 1957, No. 11, pp. 21-8, bibl. 7, illus.

N was withheld for 2 months either early, late or in mid-season. Early N shortage reduced N content of leaves and reduced flower bud formation; mid-season N shortage reduced N content of leaves; in both treatments normal seasonal uptake was attained by increased absorption later. Late N shortage did not affect leaf content or flowering and was not made up later. Absorption of K, Ca and Mg was repressed by withholding N.

2197. Mori, H., and Yamazaki, T.
Absorption of essential elements by apple trees in water culture. II. Seasonal absorption of nitrogen, potassium, phosphorus, calcium and magnesium by bearing apple trees. [Japanese, with English summary 1½ pp.]
Reps Tohoku nat. agric. Exp. Stat., 1957, No. 11, pp. 1-20, bibl. 17, illus.

Five varieties were studied. N absorption increased from early July, remained constant until harvest and then declined. K absorption reached a peak in July, when shoot growth ceased and fruits grew rapidly, and declined at harvest time. P absorption of bearing trees resembled that of non-bearing trees [see *H.A.*, 25: 3573] but peaked later. Ca intake resembled K intake but reached a peak in late June; trends were similar in bearing and non-bearing trees. Mg intake followed atmospheric temperatures and peaked in late July. Mean absorption for each element is shown graphically.

2198. Mori, H., and others.
Studies on determining soil productivity in an apple orchard. I. Effect of nitrogen, phosphorus and potassium fertilizers on the performance of young *M. sieboldii* seedlings and of wheat plants in the different layers of volcanic soil. [Japanese, with English summary ½ p.]
Reps Tohoku nat. agric. Exp. Stat., 1957, No. 11, pp. 29-38, bibl. 20, illus.

In pot experiments using soils taken from different depths, wheat was found to be a poor indicator plant for the fertility of orchard soils. Apple seedlings, however, responded to N in soil from all depths, and to P in soils from lower horizons, but did not respond to K in any test.

2199. Mason, A. C.
The concentrations of certain nutrient elements in apple leaves taken from different positions on the shoot and at different dates through the growing season.
J. hort. Sci., 1958, **33**: 128-38, bibl. 6.

Concentrations of N, P, K, Ca, Mg, Fe and Mn were determined at fortnightly intervals from May to November in successive leaves of shoots of stooled apple rootstocks. The results are presented graphically, and show a relatively orderly progression in the distribution pattern with the advancing season. Considerable variation could occur in the concentration level for specific leaf positions even in 14 days. Apical growth was associated with high concentrations of P and low concentrations of Ca and Mn in the expanding leaves, as compared with mature apical leaves of shoots which had ceased growing.—E. Malling Res. Stat.

2200. Depardon, L., and Buron, P.
Diagnostic foliaire et alternance chez le pommier de plein vent. **(Foliar diagnosis and biennial bearing in apple trees in the open.)**
Ann. agron., 1957, **8**: 739-40.

Rainfall had little effect on the K content of the leaves, as determined just before harvesting, but in years of normal yield the leaves were low in K and in alternate (barren) years the values were significantly higher.

2201. Trocmé, S.
Fumure potassique d'arbres fruitiers. **(Potassium fertilizing of fruit trees.)**
Ann. agron., 1957, **8**: 722-4, bibl. 2.

Straw mulch applied annually at 40 tons (410 kg. of K_2O) per ha. for 4 years was more effective than potassium sulphate injected into the soil at 150, 300 or 600 kg. of K_2O per ha., or worked into the surface at 150 or 300 kg. of K_2O per ha., in raising the content of K in the leaves of 12-year-old pear trees, not visibly deficient in K but growing in soil of low K status. In all treatments adequate N was supplied as ammonium sulphate. The effect of the mulch was not significantly enhanced when its application followed that of 150 kg. of K_2O per ha. to the surface soil as potassium sulphate.

2202. Dickson, G. H.
Bud variation or nutrition in pears?
Bienn. Rep. hort. Exp. Stat. Vineland 1955 and 1956, pp. 25-30, bibl. 8, illus.

Variations in fruit size and quality in Kieffer and Bartlett pears on poor clay soils were almost entirely eliminated by mulching with strawy manure and applying ammonium nitrate in spring or 10–10–10 fertilizer. Nursery roguing of trees with premature autumn colouring was a further factor in improving yield.

2203. Delmas, J., Bats, J., and Marenaud, C.
Nutrition phosphatée du pêcher en solution nutritive. **(Phosphorus nutrition of peach trees in nutrient solution.)**
Ann. agron., 1957, **8**: 713-15.

The levels of P_2O_5 compared were 1, 5, 20 and 50 p.p.m. Their effects on chlorophyll, growth and leaf composition are recorded from June to October. The most striking result was rapid and marked development of Mn deficiency at the 2 higher P rates. Increase of P stimulated the uptake of K, but depressed that of Ca. Leaf N was increased by raising P_2O_5 from 1 to 5 p.p.m., but higher P rates gave no further N increase. From August the P content of the leaves reflected the levels of P supplied.

2204. Beattie, J. M.
Foliar analysis shows value of spoils bank for fruit planting.
Ohio Fm Home Res., 1957, **42**: 65-7, illus.

Peach trees were successfully established after surface coal mining on slightly alkaline soils when N, at ¼ lb. of a 33% fertilizer per tree per year of age, was applied. Mn was also needed. Trees on acid soils had a low survival rate.

Pruning and training.

(*See also* 2238a, 2239i.)

2205. Liebster, G.
Gedanken zum "Kippobstbau". **(Thoughts on the Kipp method of training fruit trees.)**
Reprinted from *Obstbau*, 1958, Vol. 77, No. 1, pp. 3, illus.

Pruning young fruit trees according to the Kipp method confines itself to shortening the leaders during the dormant season. The lateral shoots are left unpruned to induce the early formation of a terminal fruit bud. The resulting fruit, it is argued, will weigh down the shoot and thus make its tying down unnecessary. Experiments with 3 apple varieties at the Institut für Obstbau, Weihenstephan, however, showed that such behaviour occurs only under exceptional conditions. The paper is illustrated by 24 photographs.

2206. Dermine, E., and Monin, A.
Étude sur la fructification de la pomme Cox's Orange. **(A study on the fruiting of Cox's Orange apple.)**
Fruit belge, 1958, **26**: 17-33.

The relations between fruiting, vegetative characteristics and flowering were studied in young branches of Cox trees during one season. A positive correlation was found between flower number and fruit number. The fertility factor (number of fruits developing from 100 flower clusters) varied between 53 and 110. A higher fertility factor was in general associated with poor flowering, but free-flowering branches had a higher total number of fruits. Small poorly-flowering branches had a better fertility factor than large ones, but with freely-flowering branches the opposite effect was observed. Upper branches had high fertility factors. Thick branches seemed to be slightly less favourable for fruiting than average or thin branches. Fertility factors were in general improved by hard pruning. In one-year-old branches pruning did not affect fruiting when flowering was poor, but with a high degree of flowering fruiting was improved by hard pruning.—Stat. Rech. Amél. Plantes fruit., Grand Manil.

2207. Bradt, O. A.
Heading mature Elberta peach trees.
Bienn. Rep. hort. Exp. Stat. Vineland 1955 and 1956, pp. 38-40, bibl. 1, illus.

In 1952, fourteen Elberta trees were selected. Seven of these trees were heavily headed and seven lightly headed. In the first year approximately double the amount of wood was removed from the heavily headed trees, but in the next four years the pruning weights tended to level out. The weight of fruit from the heavily headed trees was slightly reduced in 1952 but increased in the next three years. [Author's summary.]

2208. Proebsting, E. L., Jr., Fogle, H. W., and Merrill, T. A.
Height of heading and number of leaders as longterm factors in Elberta peach production.
Proc. Wash. St. hort. Ass., 1957, pp. 87-8.

From 1947–1957, in the Irrigation Experiment Station orchard, no significant differences in total yield due to type of training were observed. The less pruning given the trees the more rapidly they came into bearing. Yields were heavier in the lightly pruned treatments in the first two years of bearing. In the long run the development of a strong framework is the most important function of early training. No advantage of leaving more than three leaders could be discerned. After ten years most trees had crowded out all but three or four leaders. Moderately high heading, about 33 inches, provided opportunity for better vertical spacing of leaders. Heading higher than 33 inches frequently resulted in dieback of the top. [From authors' conclusions.]—Irrigation Exp. Stat., Prosser, Wash.

2209. Schneider, G. W., and McClung, A. C.
Prune lightly and fertilize.
Res. and Fmg N.C., 1958, **16**(3): 12, illus.

In 3 years' trials with young peach trees the highest yields were obtained from the lightest pruning. Yields increased with N applications up to 0·9 lb. per tree, but the response was not so great as to pruning. Varying the N rate did not affect peach size. Split N applications induced earlier fruit maturity than a single March application. Fruit colour was improved by light pruning and by increasing N. Colour development was not affected by the timing of N application.

Spraying for cultural purposes.

(*See also* 2238e, o, 2239m.)

2210. Uriu, K., Lilleland, O., and Koch, E. C.
Spray thinning Newtown apples.
Calif. Agric., 1958, **12**(4): 7-8, illus.

In commercial scale trials, naphthylacetamide at 40–50 p.p.m. applied at 70% petal fall satisfactorily thinned Newtown apples. Spray thinning supplemented by hand thinning has resulted in increased fruit size, with increased profits.—Univ. Calif., Davis.

2211. Bowman, F. T.
Chemical thinning improves off-year apple cropping.
Agric. Gaz. N.S.W., 1957, **68**: 644-5.

Recommended concentrations of NAA for application to several apple varieties are given [see also *H.A.*, 27: 1187c]. NAA sprays applied to biennially-bearing Jonathan and Granny Smith trees resulted in higher total yields over 2 years in comparison with untreated trees.

2212. Horsfall, F., Jr., and Moore, R. C.
Chemical thinning of apples and peaches.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 208-9.

The addition of a detergent (Tween 20) to NAA sprays enabled reduced concentrations to be effective in thinning Golden Delicious when applied 17–21 days after full bloom. Thinning of Halehaven has been successful when applied 35–48 days after full bloom. No deleterious effects were noted, and shoot growth was stimulated during the year of application and in the year following. Carbamate sprays have induced early fruit ripening in peaches [see also *H.A.*, 27: 2138].

2213. Westwood, M. N., and Batjer, L. P.
Effect of 2,4,5-trichlorophenoxypropionic acid sprays on set and yield of Anjou pears.
Proc. Wash. St. hort. Ass., 1957, p. 35.
Spraying with 2,4,5-TP increases Anjou pear set.
Bett. Fruit, 1958, **52**(6): 22.

A 7·5 p.p.m. spray at harvest time increased fruit set by 70% in the first season after spraying and by 35% in succeeding seasons with a slight reduction in size. Bartlett pears were damaged by 2,4,5-TP spray at 10 p.p.m. or stronger.—U.S. Dep. Agric. and St. Coll. Wash., Wenatchee.

2214. Verner, L., and others.
Sprays to reduce the dropping of prunes.
Proc. Wash. St. hort. Ass., 1957, pp. 19-21.

2,4,5-TP at 20 p.p.m. applied in June reduced pre-harvest drop and increased yields up to 35% with Standard Italian prunes and up to 50% with Early Italian. Spraying tended to increase size, hasten maturity and increase internal browning after storage.—Univ. Idaho.

Composition and physiology of fruit.

(*See also* 2070, 2239f.)

2215. Zachariae, A.
Untersuchungen über den Eiweisshaushalt von Äpfeln und Birnen in Abhängigkeit von verschiedenen Höhenlagen. (**Studies on the protein status of apples and pears in relation to altitude.**) [English, French and Spanish summaries 9 to 11 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 1-20, bibl. 20.

Protein synthesis was studied in Cox fruits grown at 3 altitudes. In all fruits protein N decreased after the physiological fruit fall to a minimum at maturity, increasing to a maximum during storage, and then decreasing again. Fruit from higher altitudes had a lower minimum level of protein N and a higher maximum level, which was reached later, than fruit from lower altitudes; it thus had a longer storage life. Fruit from trees on M.IX stored better than fruit from trees on M.XI. There was a steady decrease in protein N content after harvest with the pear variety Alexander Lucas.—Inst. Obstb., Bonn.

2216. Hulme, A. C., and Wooltorton, L. S. C.
Determination and isolation of the non-volatile acids of pome fruits and a study of acid changes in apples during storage.
J. Sci. Food Agric., 1958, **9**: 150-8, bibl. 14.

A comprehensive scheme for the determination of non-volatile organic acids of pome fruits using anion-exchange resins in the acid form and gradient elution is described, and the scope of the method is illustrated by the quantitative examination of a synthetic mixture containing fourteen acids. Changes measured by this method in the organic acids of the peel and pulp of Bramley's Seedling apples during storage at 15° C. are shown.—Ditton Lab., D.S.I.R., Maidstone, Kent.

2217. Neal, G. E., and Hulme, A. C.
Activity of cytoplasmic particles isolated from apples.
Nature, 1958, **181**: 1469-70, bibl. 6.

Polyphenolase activity was associated with the particles, but browning occurred only on addition of phenolic substrates present in the supernatant. The fact that succinic and malate oxidation occurs only in the presence of protocatechuic acid provides a possible explanation of the fact that post-climacteric apple tissue will not oxidize malate in absence of oxygen, although no oxygen uptake occurs when malate is oxidatively decarboxylated in air.—Ditton Lab., D.S.I.R., Maidstone, Kent.

2218. Lieberman, M.
Isolation of cytoplasmic particles with cytochrome oxidase activity from apples.
Science, 1958, **127**: 189-90, bibl. 10.

No cytochrome oxidase activity was observed when young Rome Beauty fruits were extracted in a medium having a pH of 7. Good cytochrome oxidase activity was observed in extracts at pH 9·2.—Agric. Mktg Serv., Beltsville, Md.

2219. Wolf, J.
Einfluss einer vorangegangenen Lichtperiode auf die Grösse der CO_2-Ausscheidung grüner (unreifer) Äpfel im Dunkeln. (**The effect of a preceding light period on the rate of CO_2 emission by green (immature) apples in the dark.**)
Planta, 1958, **50**: 576-8, bibl. 4.

The emission of CO_2 by green apple fruits (variety Goldparmäne) of 40–60 g. rose steeply after picking under both aerobic and anaerobic conditions. The phenomenon did not occur in fruits which had been darkened for several hours before picking, but the rate of respiration rose in apples picked 24 hours earlier and exposed to light for a period before measurement. It is concluded that the photosynthetically active fruit has a low CO_2 content and that the balance between

CO_2 production and CO_2 emission is gradually restored in the dark. The atmosphere in the pulp appears thus to be largely determined by the skin, the suction of the latter depriving the interior tissues of some of their CO_2. The magnitude of the suction force exerted by the photosynthetically active skin was demonstrated by an experiment in which the apple was kept for 14 hours in a stream of CO_2-free air. This treatment failed to produce the effect observed in apples which had been exposed to light, for CO_2 emission at a uniform rate occurred almost at once. It is suggested that measurements of apple fruit respiration will yield correct values only after the gradient between the CO_2 in the pulp and the atmosphere has reached a steady value.—BundesforschAnst. Lebensmittelfrischhaltung, Karlsruhe.

Harvesting and packing.

(*See also* 2145, 2146b, v, 2238r, s, u, 2239k.)

2220. Wilking, E.
Arbeitsleistungen und Lohnformen bei der Ernte und Aufbereitung von Obst. (**Labour efficiency and methods of payment for the harvesting and packing of fruit.**) [English and French summaries 1½ pp. each.]
Landw.-ang. Wiss., Sonderheft Gartenb. **25**, 1958, pp. 88, bibl. 22, illus.

The following aspects were considered in time studies on the harvesting of 4 apple varieties: Picking, comparing types of ladder and types of tree; transport; grading and packing. The introduction of piece rates for picking and grading increased the performance considerably without affecting the quality of the work. —Inst. Obstb., Univ. Bonn.

2221. Gillette, D. G., and French, B. C.
Costs of packing apples in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 286-99, bibl. 26.

Based on 1956 wage rates, the costings from 18 packing plants per 100 lb. apples averaged $1.87 for bushel baskets, $1.33 for bushel cartons, $0.66 for open crates and $2.22 for film bags in master containers.

2222. Straniero, D.
Speeds fruit, vegetable ripening.
Food Engng, 1957, **29**(5): 68, 71, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2371.

The technique described can be varied to provide rapid ripening of fruits and vegetables, controlled storage conditions, or fumigation. The products are placed in a tightly closed insulated container or warehouse, in which the temperature and humidity can be controlled, and mixtures of gases can be adequately distributed. When used for ripening the products, patented mixtures of oxygen and nitrogen are supplied and the temperature is maintained at 65° to 70° F. (18° to 21° C.); a degree of ripeness can be attained in 2 to 5 days which would take up to 2 months under natural conditions. When used for storage, the percentage of nitrogen in the atmosphere is increased; a temperature of 60° to 65° F. (16° to 18° C.) is usually satisfactory, but refrigeration is applied if storage is to be prolonged. When used for fumigation, the gas mixture supplied is designed to increased the respiratory activity of the insects, and it also contains a small amount of methyl bromide; only about ⅐ the amount of methyl bromide required in vacuum fumigation is required by this method. The equipment is described, with special reference to its use in railway vans.

2223. Stevens, G. A.
Extent and nature of bruising of Maryland peaches from the orchard to the retail store.
Diss. Abstr., 1957, **17**: 2360, being *Publ.* 23,287 of 163 pp.

The amount of bruising caused during picking averaged 4·48% of the total crop. Bruising was increased by 3·83% of the total crop during transport from orchard to packhouse. A large proportion of bruising was not immediately apparent, and percentages increased after 48 hours. Bruising in field crates was less than in bushel baskets during transport to retail stores.—Univ. Maryland.

2224. (LaBelle, R.)
Bruising held cause of scald in cherries.
Bett. Fruit, 1958, **52**(7): 2.

Bruising during picking and handling starts scald in cherries. Severe scald develops within 4 hours at 85° [F.] or above, and cooling immediately after picking is recommended to prevent rapid scald development.—Cornell Exp. Stat., Geneva.

Storage.

(*See also* 2238t, 2946, 2947.)

2225. Anon.
Hydro-cooler for the rapid pre-cooling of fruit and vegetables.
Mod. Refrig., 1957, **60**: 6-7, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2357.

In the Prestcold hydro-cooler described, crates of fresh fruits or vegetables are passed on a conveyor through a bath of iced water while also being sprayed from overhead with iced water. Water is circulated along the bath, over an ice bank (formed on evaporator plates cooled by direct expansion refrigeration), and through the overhead sprays, by a centrifugal pump. The cooler can treat 500 bu. of apples daily, cooling them from 65° to 40° to 45° F. (18° to 4° to 7° C.) at the core. Apples about 3 in. in diameter (Cox's Orange Pippin) cool in 30 to 40 minutes. The speed of the conveyor can be adjusted to ensure that the produce is cooled to the core. The tank can hold 40 bu. boxes. Chemicals to control Gloeosporium rot and scab can be added to the water. Leafy vegetables cool more quickly than apples, e.g. an open crate of 30 lb. of cabbage is cooled to about 45° F. (7° C.) in about 5 minutes.

2226. Eggert, F. P.
Does the method of stowage in storage affect keeping quality of apples?
Me Fm Res., 1958, **5**(4): 25-7.

Increasing the space between crate ends from 1 in. to 3½ in. and orientating crates across the air flow made little difference to time of cooling from 75° to 32° F. Apples stored in cell-pack cartons took much longer to cool than those in wood crates.

2227. Sainsbury, G. F., and Schomer, H. A.
Influence of carton stacking patterns on pear cooling rates.
Mktng Res. Rep. U.S.D.A. **171**, 1957, pp. 10, bibl. 1, illus.

The cooling rate of Anjou pears in wooden boxes was compared with that in multi-layer fibreboard cartons, various methods of stacking being used. Field heat was lost more slowly from cartons than from boxes, especially with tight stacking. Differences between stabilized storage temperatures of pears in cartons and in boxes were much greater with tight stacking than when more of the surface was exposed. The increased cooling time and higher storage temperature of the fruit in tightly-stacked cartons resulted in loss of quality in the pears.

2228. Eaves, C. A., Hockey, J. F., and Ross, R. G.
Effects of orchard fungicides on stored McIntosh apples.
Canad. J. Plant Sci., 1958, **38**: 246-51, bibl. 8.

The behaviour in storage of McIntosh apples was studied after spray schedules of phenyl mercuric acetate, ferbam, glyodin, captan and sulphur paste. During the 3-year investigation phenyl mercuric acetate was significantly associated with the least amount of fungal rotting and the maximum acid content in the fruit, after storage at 32° F. for 5–6 months.—Canad. Dep. Agric., Kentville, N.S.

2229. Stoll, K.
Über den Einfluss von Fungiziden auf die Qualität und das Lagerungsverhalten von Äpfeln. **(The effect of fungicides on quality and storage behaviour of apples.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 36-40, 120-4, bibl. 4, illus.

Copper sprays were the most successful in reducing the amount of storage scab on fruits of Boskoop and Glockenapfel. Trees were most susceptible to russeting from just before flowering until 3 weeks after flowering, and fruit sprayed with copper or glyodin plus parathion showed a high degree of russeting. Reddening of lenticels occurs more frequently on trees with dwarf stocks, but early picking reduces its occurrence. Fungicides which affected lenticels on Golden Delicious fruits also caused an increase in Jonathan spot. No specific effect on fruit taste was apparent with any of the fungicides tested. Copper sprays gave the best results in *Gloeosporium control*.—Eidg. Versuchsanst., Wädenswil.

2230. Rasmussen, P. M.
Forsøg med opbevaring af aebler efter forskellige plukketidspunkter. (**The storage behaviour of apples in relation to time of picking.**) [English summary 1½ pp.]
Tidsskr. Planteavl, 1958, **62**: 26-46.

Apple varieties especially susceptible to *Gloeosporium* rot, such as Cox's Orange, Ingrid Marie and Laxton's Superb, should be picked as soon as they have reached the necessary size, as a delay will involve rotting. Other varieties less susceptible to *Gloeosporium* can be picked at a more advanced stage of maturity and be allowed to reach full size and colour.—Blangstedgaard.

2231. Hiam, N. J.
Control of storage scald in Granny Smith apples.
Orchard. N.Z., 1958, **31**: 59-61, illus.

Scald in storage at 32° F. was lowest in Granny Smiths picked between May 8 and 22. Earlier picking (about April 20) is possible with dual temperature storage. Oil wraps are necessary, if fruit is to be stored later than August 1, in either storage system.

2232. Padfield, C. S.
Superficial scald: some methods of control, reported overseas, applied to New Zealand grown Granny Smith apples.
N.Z. J. agric. Res., 1958, **1**: 231-8, bibl. 6, illus.

Satisfactory control of blotchy superficial scald on Granny Smith apples held in cool store for 200 days can be obtained with oiled wraps containing 10–12% oil. After 200 days' storage, partial control of senescent scald was obtained using wraps containing 15 to 20% oil. Re-wrapping fruit with fresh oiled wraps after 3 months' storage did not aid scald control. Reduction of temperature from 37–38° F. to 31–32° F. after 4 weeks' storage did not assist scald control. Destruction of cuticle by physical means increased scald and had a deleterious effect on the appearance of the fruit. Wiping apples with ethyl alcohol reduced scald in one season, but had no effect the following year. A spray programme using captan as a fungicide in place of sulphur had no effect on subsequent development of scald on stored apples. [Author's summary.]

2233. McIntosh, D. L., and Porritt, S. W.
The effect of storing apples in polythene box liners on the development of bull's-eye rot, caused by *Neofabraea perennans*.
Plant Dis. Reptr, 1958, **42**: 97-9, bibl. 5.

Apples packed in polythene box liners developed a much higher incidence of bull's-eye rot infections (*Neofabraea perennans*=*Gloeosporium perennans*) in cold storage than paper-wrapped or loose fruit. Relative humidity and carbon dioxide concentration were much higher in the atmosphere within the polythene bags than in the storage atmosphere. Bagged fruit, judged by colour, firmness and flavour, was less ripe than wrapped fruit. It is suggested that in trials on control of *Neofabraea perennans* differences between treatments may be accentuated by storing the fruit in polythene box liners.—Exp. Fm, Summerland, B.C.

2234. Buchloh, G.
Zur Entstehung von Fruchtfleischverbräunungen bei Äpfeln. (**The origin of internal fruit browning in apples.**)
Gartenbauwiss., 1957, **22**: 449-79, bibl. 62, illus.

Fruits of Ontario, Jonathan and Abbondanza were taken at 3 climacteric stages from storage at 4° C., and kept for 4 to 32 days at temperatures between +2° and −2° C. When the RQ value for Ontario and Abbondanza was about 1, any internal browning induced at low temperatures was inhibited by a return to 4° C. At higher RQ values internal browning was no longer halted by increasing the temperature.

In Jonathan fruits at the start of a climacteric rise in respiration, temperatures of 0° and −1° C. increased the RQ, and internal browning did not occur until −2° C. Fruits of all varieties tended to be supercooled, and at −2° and −3° C. no ice formation was observed. At −4° C. fruits were supercooled in a normal atmosphere but with higher CO_2 percentages there was some crystallization. The signs of internal browning caused by supercooling were similar to cold storage disorders. Small ice crystals were formed at −7° to −12° C. with rapid heat absorption and a short period of supercooling (1–10 hours). Fruit was damaged by freezing when heat absorption was slow and water loss from intracellular ice crystal formation was 43%. Browning of the parenchyma was related to the oxidation of ascorbic acid to dehydroascorbic acid. No specific ascorbic acid oxidase was found in the experimental fruits, and it is suggested that hydroperoxidase may be the enzyme that releases oxygen. It is concluded that pigmentation at freezing temperatures results from a disturbance in the metabolic processes, which in cold storage conditions results in discoloration of fruit parenchyma.—Inst. Obstb., Univ. Bonn.

2235. Mezzetti, A.
Un'alterazione delle mele: il disfacimento interno. **(A disorder of apples—internal breakdown.)**
Reprinted from *Progr. agric.*, 1957, **3**(7), pp. 13, illus.

A type of internal breakdown was very prevalent in northern Italy early in 1956 among stored apples, including the varieties Abbondanza, Imperatore, Stayman Red, Rambour Frank and Turley. Symptoms are described and compared with those of recognized physiological storage disorders. The effects of factors operating before and during cold storage are discussed. Conclusions from various authors regarding optimal storage conditions are discussed.

2236. van Hiele, T., and van de Plasse, J. B.
Gasbewaring van het appelras Laxton's Superb. **(Gas storage of Laxton's Superb apples.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1958, **21**: 156-61.

Laxton's Superb kept well in gas storage (8% CO_2 and 12% O_2) at 2–3° C. until the middle of April. Scrubbed gas storage was unnecessary. Fruits were firmer after gas storage than after cold or ordinary storage. Laxton's Superb fruits were successfully stored with Bramley Seedling, Winston or Golden Delicious, providing that the CO_2 concentration was not above 8% and the stores were emptied by mid-April. Laxton's Superb is preferred to Cox for gas storage as it has better keeping qualities.—Inst. Bewar. Verwerk. Tuinbouwprod., Wageningen.

2237. Ravines, A.
Conservación de frutas por el método del desecado natural. **(Preservation of fruit by natural drying.)**
Inf. SCIPA, 1957, No. 29, pp. 43-51, illus.

Instructions are given for (1) the preparation and use of caustic soda for removing or dewaxing skins of fruits, (2) sulphur dioxide treatment, and (3) pretreatment and drying of peaches, apricots, grapes, figs, cherries and pears.

Noted.

2238.

a Bernstorff, H.
Weiterentwicklung unserer Schnittmethoden. **(Further development of our pruning methods.)**
Mitt. ObstVersuchsringes Jork, 1958, **13**: 17-28, illus.
An illustrated review of Jork pruning methods adapted to individual apple varieties.

b Bolotskij, Ju. S.
Trials with *Prunus fructicosa* in Burjat-Mongolia. [Russian.]
Agrobiologija, 1957, No. 6, pp. 138-40, illus.
Pollination with sour cherry varieties improved fruit size and quality.

c Bos, J.
Hoeveel stikstof in boomgaarden? **(How much nitrogen for orchards?)**
Stikstof, 1958, No. 17, pp. 152-8, illus.
Requirements of grassed-down and clean-cultivated orchards are discussed.

d Bosch, E.
Weitere Erfahrungen bei der Bekämpfung des Rötels der Kirschbäume. **(Further observations made on the control of fruit drop in cherry trees.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 188-9, illus.
Including notes on the effect of temperature on the action of α-naphthylacetic acid sprays. [For earlier work see *H.A.*, 27: 1132 and 1133.]

e Bowen, T. J.
2,4,5-TP stops fruit drop in apple trees.
Qd agric. J., 1958, **84**: 83-4.
See *H.A.*, 28: 1146.

f Cassidy, M. A.
Deciduous fruit production in the eastern districts of Southern Rhodesia.
Rhod. agric. J., 1958, **55**: 120-54, bibl. 18, illus.
Propagation, varieties, planting, management, harvesting and packing.

g Cooper, C., and Madden, B.
Our program for building hardy trees.
Proc. Wash. St. hort. Ass., 1957, pp. 175-9.
Seven winter-hardy apple stocks described.

h Ealy, R. P.
A technique for the introduction of radioactive solutions into woody stems of trees and shrubs.
Tech. Bull. Okla. agric. Exp. Stat. **T-70**, 1957, pp. 4, illus.
For use with young fruit and nut trees.

i El-Azzouni, M. M., and Wali, Y.
The effect of different rootstocks on the physical and chemical composition of Le Conte pear.
Ann. agric. Sci., Cairo, 1956, **1**(1): 155-76, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,485.
Some morphological and chemical changes occurring in the fruit at various stages of development.

j Fritzsche, R., and Wirth, A.
Erstellungs- und Erziehungskosten von Obstanlagen. **(The cost of establishing and maintaining an orchard up to bearing age.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 108-16.
With special reference to apple.

k Gerritsen, C. J.
Zijn er in Nederland moglijkheden voor de teelt van buitenperziken? **(Can peaches be grown out of doors in the Netherlands?)** [English summary ½ p.]
Meded. Inst. Vered. Tuinbouwgew. **124**, 1958, pp. 23, bibl. 54.
Conditions are suitable in some areas and varietal trials are in progress. [A fuller account of *H.A.*, 28: 108n.]

l Hafez, M. G. A., Ahmed, M. B., and Ezelarab, G.
Studies on growth-regulating substances. I. The effect of growth-regulating substances on root formation of stem cuttings of pomegranate (easy-rooted) and sweet orange (hard-to-root). II. The effect of an endospermic extract of maize grains on rooting and shooting of stem cuttings of certain fruit trees.
A'in Shams Sci. Bull. Cairo, 1956, No. 1, pp. 33-46, 47-56, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstrs 101,405 and 101,406.

m Harrison, T. B.
Peach variety testing in southwestern Ontario.
Fruit Var. hort. Dig., 1958, **12**: 37-8, illus.
Recommended varieties for commercial planting.

n von Hauch, D.
Der dänische Erwerbsobstbau. **(Commercial fruit growing in Denmark.)** [English and French summaries 2 pp. each.]
Landw.-ang. Wiss., Sonderheft Gartenb. **22**, 1957, pp. 78, bibl. 100, illus.
Climate and soil, statistics, cultural methods, economics.

o Hoffman, M. B.
Chemical thinning of apples.
Proc. N.Y. St. hort. Soc., 1958, pp. 139-43.
Results of 6 years' trials with Golden Delicious.

p Kaz'min, G. T.
New intergeneric hybrids of cherry-plum. [Russian.]
Agrobiologija, 1958, No. 1, pp. 141-3, illus.
Cerasus tomentosa × *Prunus ussuriensis* and cherry-plum (*C. besseyi* × *P. ussuriensis*) × *C. tomentosa*.

q Kimura, M., Sobajima, Y., and Osamura, Y.
Studies on the amount of the nutrient elements absorbed by peach trees. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 267-76, bibl. 6, illus.
Contents of N, P_2O_5 and K_2O were determined in a 2-year-old and in a 7-year-old peach tree.

r McBirney, S. W.
Bulk bins for harvesting and handling fruit.
Proc. Wash. St. hort. Ass., 1957, pp. 139-43.
Specifications of various types of pallet bin being used for apples and pears.

s Matson, J.
Two years' experience with bulk bins.
Proc. Wash. St. hort. Ass., 1957, pp. 145-6.
Harvesting apples, using a mechanical ladder and pallet bins.

t Mauch, A.
Erkenntnisse bei der Planung von Obstlager- und Sortierräumen. **(Observations on the planning of buildings for fruit storage and grading.)**
Mitt. ObstVersuchsringes Jork, 1958, **13**: 60-8, illus.
Cost, materials, layout, equipment.

u Melville, F., and Bloomfield, J. S.
A guide to the harvesting of plums for export.
J. Agric. W. Aust., 1957, **6**: 661-4, illus.
Colour plates illustrate 8 stages of maturity for 2 export varieties, Narrabeen and Wickson.

v Ministry of Agriculture, London.
The pollination of plums and cherries.
Adv. Leafl. Minist. Agric., Lond. **378**, revised 1958, pp. 6.
Selection of pollinators, use of bees, varietal compatibility, and relative dates of flowering.

w Ozolina, L. I.
Raising mulberry seedlings in the Issyk-Kul region. [Russian.]
Sb. stud. naučn-issled. Rabot. Kirgizsk. s.-h. In-ta, 1956, No. 4, pp. 17-18, from *Ref. Ž. (Biol.)*, 1957, No. 20, Abstr. 86,445.
Best growth with P fertilizers and coal dust mulch.

x Pasečnik, S. T.
The South Kirgiz forest-fruit reservation. [Russian.]
Priroda, 1957, **46**(12): 75-8, illus.
A natural source of walnut, pistachio, apple, plum and other fruits, berries and technical and medicinal plants.

y Passecker, F.
Die Verwendung von Plastikfolien bei der Anhängervermehrung von Obstgehölzen. **(The use of plastic sheets for air-layering fruit trees.)** [English, French and Spanish summaries 3 or 4 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 40-3, bibl. 5.
Results with Airwrap were no better than with ordinary plastic sheets.

z Passecker, F.
Zur Frage des "primären" und "fertilen" Stadiums bei Apfelsämlingen. **(Investigations on the "primary" and "fertile" stages of apple seedlings.)**
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 116-17, bibl. 9.
A view opposed to that of K. J. Maurer [*H.A.*, 28: 117].

2239.

a Plock, H.
Über die Verträglichkeit der verschiedenen Marillensorten in der Baumschule. **(Compatibility of apricot varieties in the nursery.)** [English, French and Spanish summaries 3 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 96-8.
Results are tabulated.

b du Preez, D.
Well-known fig varieties.
Dec. Fruit Gr, 1958, **8**: 36-42, illus.
Thirteen varieties described and photographed.

c Pulselli, A.
La peschicoltura del viterbese. **(Peach growing in the Viterbo district.)** [English, French and German summaries 3–4 lines each.]
Frutticoltura, 1958, **20**: 132-6, illus.

d Rjabov, I. N., and Kostina, K. F.
Achievements in stone fruit breeding at the Nikitskij Botanic Garden. [Russian.]
Agrobiologija, 1957, No. 5, pp. 41-54, illus.
A review of work for 1925–1955.

e Rogers, W. S.
Advances in rootstock research.
J. roy. agric. Soc., 1957, **118**: 64-75, bibl. 32, illus.
Work at East Malling reviewed.

f Rootsi, N.
Zur Methodik der Askorbinsäurebestimmung bei Äpfeln. **(On methods of determining ascorbic acid in apples.)**
Acta Agric. Scand., 1958, **8**: 117-30, bibl. 20.

g Scaramuzzi, F.
Contributo allo studio delle cultivar di cotogno da frutto. **(Contribution to the study of quince varieties grown for fruit.)** [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 575-615; 1958, **42**: 21-50, bibl. 14, illus.
Pomological descriptions of 22 varieties.

h Schwarzenbach, W.
Zur Gestaltung und Förderung des Obstbaues in der deutschsprachigen Schweiz. **(On the set up and progress in fruit growing in German-speaking Switzerland.)** [French summary 1½ pp.]
Landw. Jb. Schweiz., 1958, **7**: 1-80, bibl. 85, illus.

i Snyder, J. C.
How to make apple trees produce wide angles.
Proc. Wash. St. hort. Ass., 1957, pp. 165-6.
Pruning instructions for Delicious.

j Stefan, N.
Pomicultura in Republica Pupulară Democrată Coreeană. **(Fruit growing in the Korean People's Democratic Republic.)**
Gradina, via şi livada, 1956, **5**(8): 73-9, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,799.
Tihonov, N. P.
Fruit growing in the Korean People's Democratic Republic. [Russian.]
Sad i Ogorod, 1958, No. 2, pp. 68-9, illus.
Orchard area; fruit species, of which the apple is the most important; varieties; experiment station at Nampho.

k Stewart, N.
Bulk fruit handling has its unsolved problems.
Comm. Gr, 1958, No. 3244, pp. 495-7, illus.
Container size, re-design of packing shed and compaction of fruit.

l Teterev, F. K.
Some results of fruit selection in the U.S.S.R. [Russian.]
Agrobiologija, 1957, No. 6, pp. 61-7.
A brief review of top and small fruit selection during the past 40 years.

m Thompson, A. H.
Spray thinning of apples in Maryland.
Proc. N.Y. St. hort. Soc., 1958, pp. 144-8.
Trials with an NAA–Tween mixture.

n Weber, F. B. C.
Horticulture in the Himalayas.
World Crops, 1958, **10**: 169-71, illus.
Planned development of a fruit-growing and processing industry in Uttar Pradesh.

o Weinberger, J. H., Braun, O. M., and Thompson, L. A.
Pollenizers for new plum varieties.
West. Fruit Gr, 1958, **12**(2): 22-5, illus.
Results with 6 Japanese plum varieties at Fresno, Calif.

p Welchert, P.
Süsskirschen-Sorten im Vergleich. **(Sweet cherry varieties compared.)**
Dtsch. Baumsch., 1958, **10**: 125-34, bibl. 4.
Twenty-seven varieties grown in Germany.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 2145, 2158, 2188, 2301d, j, q, x-z, 2302a, b, e, 2946, 3204.)

2240. Whiting, G. C.
The non-volatile organic acids of some berry fruits.
J. Sci. Food Agric., 1958, **9**: 244-8, bibl. 17.

The organic acids of a number of berry fruits (soft fruits) have been examined qualitatively and quantitatively using the methods of paper chromatography, silica gel partition chromatography and ion exchange. In blackcurrant, redcurrant, whitecurrant, loganberry, raspberry, strawberry and elderberry the predominant acid was citric acid, with smaller amounts of malic acid; in blackberry malic acid was predominant, with large amounts of lacto*iso*citric acid and *iso*citric acid also present. Gooseberry was examined at stages during growth; shikimic acid was the dominant acid in very young fruits, later citric and malic acids predominated. Both shikimic and quinic acids were detected in gooseberry, blackberry and elderberry. [Author's abstract.]—Long Ashton Res. Stat.

2241. Mann, G., and Chappell, D. J.
A small-scale method of pre-cooling and of transporting pre-cooled soft fruits.
Mod. Refrig., 1957, **60**: 357-9, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2358.

An insulated gas-tight container, holding 72 1-lb. punnets of fruit in 6 layers, and suitable for transport by passenger train, is described. Equipment has been constructed to pre-cool the fruit by means of liquid or solid carbon dioxide.

2242. Tomaszewska, E., and Tomaszewski, M.
Chemiczna i fizykochemiczna analiza owoców kilku gatunków kwaśnic (*Berberis*). **(Results of chemical and physico-chemical analyses of the fruits of some species of *Berberis*.)** [English and Russian summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1957, **76**: 709-15, bibl. 15.

The physical and chemical characteristics of the fruits of *Berberis vulgaris* and 5 Asiatic species of *Berberis* are given. The average vitamin C content of *B. vulgaris* was 39·6 mg. %, while that of the Asiatic species varied from 104·8 to 170·4 mg. %. It is suggested that *Berberis* fruits might be used in human nutrition.

2243. Klämbt, H.-D.
Untersuchungen über Entwicklung und Wuchsstoffhaushalt bei *Ribes*-Arten. I. Mitteilung. Cytologische und wuchsstoffphysiologische Untersuchungen der Samen je einer Kultursorte von *Ribes nigrum* L. und *Ribes petraeum* Wulf. × *Ribes multiflorum* Kit. nach Selbst- und Fremdbestäubung. **(Studies on the development and growth substance balance of *Ribes* species. I. Cytological and growth substance studies on the seeds of cultivated varieties of *Ribes nigrum* and *R. petraeum* × *R. multiflorum* after self- and cross-pollination.)**
Planta, 1958, **50**: 526-56, bibl. 51, illus.

(1) In selfed seeds of both species development was retarded as compared with cross-pollinated seeds. (2) The regression curves for the share of the seed in the fruit weight in relation to the number of seeds per fruit showed differences between selfed and cross-pollinated berries. These differences were in agreement with those found in the cytological investigation and they could be explained by a study of the growth substances: the slower development of selfed seeds was associated with a lower level of growth substance production. (3) Four growth substances (A, B, C, D) and an inhibitor (I) affecting fruit growth were detected. Only B was identified clearly as β-indoleacetic acid. (4) In both selfed and cross-pollinated berries the growth substances C and D occurred in the same relation to the fruit weight. They occurred in the free form in the seeds and they seemed to be the compounds regulating fruit growth. The acid growth substances A and B did not occur in the free form in seeds, but only in the form of complexes (AK and BK). (5) With the detection of AK and BK the existence of growth substance compounds, which yield two growth substances after hydrolysis in ammoniacal solvents (A and B=IAA), has been demonstrated for the first time with the aid of paper chromatography. AK and BK are ether-soluble and resistant to hot NaOH. A further growth substance compound was detected in seed extracts (BKX), which after hydrolysis with hot NaOH yielded the complex BK. None of the three substances, AK, BK and BKX, is a protein compound. (6) Observations suggest that AK is an inhibitor, while BK is probably physiologically inactive. In BKX the seed apparently possesses an inactive growth substance reserve. (7) There were differences in concentration of AK and BK between selfed and cross-pollinated berries. The formation of both substances seems to occur when growth substance production exceeds the optimum. (8) Treatment of the berries with naphthaleneacetic acid had a measurable effect on the native growth substances. This is a first step towards an understanding of the action of synthetic growth substances. [Translation of author's summary.]—Inst. f. Obstbau, Univ. Bonn.

2244. Hilkenbäumer, F., and Klämbt, H.-D.
Die Berücksichtigung der Befruchtungsverhältnisse bei Schwarzen und Roten Johannisbeeren für den erwerbsmässigen Anbau. **(Considerations on pollination of black and red currants under commercial conditions.)**
Rhein. Mschr. Gemüse-, Obst- u. Gartenb., 1958, **46**: 11-12, from abstr. in *Beerenobstschriftum*, 1958, No. 10, p. 9.

Varietal differences in degree of self-sterility have been observed with black and red currants. Rosenthals Langtraubige and Boskoop are partially self-sterile and should be planted in alternate rows with Silvergieters Zwarte and Goliath which are completely self-fertile. Block planting of red currants to a width of 30 m. is satisfactory.

2245. Jehn, A.
Die Berücksichtigung der Befruchtungsverhältnisse bei Schwarzen und Roten Johannisbeeren für den erwerbsmässigen Anbau. **(Considerations on pollination of black and red currants under commercial conditions.)**
Rhein. Mschr. Gemüse-, Obst- u. Gartenb., 1958, **46**: 69-70, from abstr. in *Beerenobstschriftum*, 1958, No. 10, pp. 9-10.

Growth substance sprays [compounds not named] have improved yields of blackcurrants without damaging the foliage.

2246. Hall, I. V.
The tap root in lowbush blueberry.
Canad. J. Bot., 1957, **35**: 933-4, bibl. 6, illus.

Tap root systems are described for 2 species of *Vaccinium*. It is suggested that an extensive tap root system may account for the ability of a blueberry plant to grow on very poor soils, while producing heavy crops of fruit.—Plant Path. Lab., Kentville, N.S.

2247. Johnston, S.
Investigations with plastic covers for blueberry propagating frames.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 530-4, illus.

The average rooting percentage of blueberry cuttings were 89% under glass, 87% under wired plastic and 84% under clear plastic covers. Burlap shades were used in all treatments. The use of various colours of polythene without shade was unsatisfactory. Maximum temperatures in propagating frames in June were considerably higher under clear plastic covers than under glass or wired plastic.

2248. Doehlert, C. A.
Blueberry pruning.
26th annu. Blueberry Open House, N.J. agric. Exp. Stat., 1958, pp. 2-6.

Two hand methods and 2 power methods of pruning fruiting blueberry bushes have been compared. The number of fruiting twigs was approximately the same before and after treatment with all methods. Berry size was not seriously affected by pruning method. The 2 power methods of pruning, and hand pruning by selecting and cutting out areas of poor wood, were much quicker than hand pruning by twig selection, and yields were not reduced by the quicker pruning methods.

2249. Uhe, G., Jr.
The influence of certain factors on the acidity and sugar content of the Jersey blueberry.
Econ. Bot., 1957, **11**: 331-43, bibl. 19, illus.

Sugar content increased and acidity decreased with berry size and late harvesting. Sugar content was not significantly affected by fertilizer treatment but N+S treatment appeared to increase acidity. Seediness increased with berry size.—Oregon St. Coll., Corvallis.

2250. Stretch, A.
Maintaining blueberry quality.
26th annu. Blueberry Open House, N.J. agric. Exp. Stat., 1958, pp. 14-16.

Air blast cooling of blueberries in open plastic pint containers reduced the temperature in 5 min. from 81° F. to 31° at the top of the container and 51° at the bottom. In a 1 in. layer the temperature was reduced by air blast cooling from 94° F. to 32° F. in 5 min. Work on fungicidal dips is in progress.

2251. Piechocka, J.
Badanie składu chemicznego borówki bagiennej *Vaccinium uliginosum* L. ze specjalnym uwzglednieniem zmian zawartości witaminy C w jagodach przechowywanych w chłodni. **(Investigation of the chemical composition of berries of *Vaccinium uliginosum*, with special reference to changes in vitamin C during cold storage.)**
Roczn. Zakl. Hig., Warsaw, 1957, **8**: 269-74, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2503.

Bog whortleberries (*Vaccinium uliginosum*) are exceptionally rich in ascorbic acid, containing 40 to 50 mg. %. When the berries were stored at −18° C., nearly the whole of the original content of ascorbic acid was retained.

2252. Shaw, F. R., Shaw, W. M., and Weidhaas, J.
Observations on sugar concentrations of cranberry nectar.
Glean. Bee Cult., 1956, **84**: 150-1, from abstr. in *Bee World*, 1958, **39**: 102.

The sugar concentration of nectar produced by 3 cranberry varieties was determined by refractometer readings of nectar taken from the honey sacs of bees working specific varieties. Mean readings of 45·7, 50·2, and 54·7% were obtained respectively for the varieties MacFarlin, Howes and Early Black. Temperature and relative humidity readings were made at half-hour intervals during the period of observations between 10 a.m. and 2 p.m.

2253. Newton, W., and van Adrichem, M. C. J.
Resistance to verticillium wilt in F_1 generations of self-fertilized species of *Fragaria*.
Canad. J. Bot., 1958, **36**: 297-9, bibl. 2.

Seedlings resistant to verticillium were obtained among the F_1 generation of selfed plants of *Fragaria chiloensis*, *F. ovalis* and *F. yukonensis*. Selfed *F. orientalis* plants produced seedlings with some degree of tolerance, but selfed *F. vesca*, *F. bracteata* and *F. virginiana* plants yielded neither tolerant nor resistant plants.—Plant Path. Lab., Saanichton, B.C.

2254. Dimitrov, P., and Topčijski, S.
The importance of seed stratification in strawberry selection. [Bulgarian, with Russian and German summaries 1 p. each.]
Nauč. Trudy Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1957, **4**: 103-10, bibl. 6.

The germination of hybrid seeds of strawberry sown immediately after extraction from the fruit is retarded and fruiting the following season is inadequate for selection. Of several pre-sowing treatments tested with seeds of Madame Moutot × Eva Macherauch, stratification in the open or at 2–5° C. for 60 days was found to be the best, resulting in even germination and vigorous seedlings, which formed flower buds before the autumn and fruited the following year. In strawberry seedlings flower bud initiation did not require temperatures below 10] C., but for further development low temperatures were necessary.

2255. Smith, M. C., and Harland, S. C.
Can this mean Climax free of yellows?
Grower, 1958, **49**: 549-50, illus.

Strawberry propagation by crown cuttings is described. Leaves, apex and roots are trimmed away and the crowns are cut into transverse sections, about 1 cm. in depth. Good results have been obtained by burying the cuttings in damp peat at 60–65° F., and potting them up when growth starts. Sand has been the best potting medium. First leaf expansion occurs after 14–17 days, but roots are formed only after 4 weeks. Young plants may be planted in the field in April from December propagation. Triomphe has been successfully propagated. Climax has also rooted successfully, and some of the young plants showed no symptoms of yellows, while others exhibited yellows symptoms from the earliest stages of growth. The inference is that the causal factor of yellows may be irregularly distributed in the rhizome. Climax has also been propagated from undifferentiated runner tips and here again no yellows has appeared in plantlets up to 3 months old.—Bot. Dep., Univ. Manchester.

2256. Guttridge, C. G.
The effects of winter chilling on the subsequent growth and development of the cultivated strawberry plant.
J. hort. Sci., 1958, **33**: 119-27, bibl. 6, illus.

Two series of low temperature treatments were given to Royal Sovereign and Climax plants. Plants placed in November under controlled conditions of an 11-hour photoperiod at 60–62° F. continued flower initiation, produced no stolons, had short petioles, small leaves and increased root and crown dry weight. After cold treatment (36 or 72 days at 35–40° F.) plants in a similar environment made vigorous vegetative growth with strong runner production, long petioles and large leaves, while flower initiation was delayed for several weeks. Modification of the carbohydrate status by shading in autumn and by low light intensity treatments in spring had a small effect on the expression of post-chilling vegetative vigour.—Scot. hort. Res. Inst., Mylnefield.

2257. Thorsrud, J.
Om mikroklimaet i et jordbaerfelt. **(The microclimate in a strawberry field.)** [English summary 1 p.]
Forskn. Landbruk., 1958, **9**: 39-48, bibl. 4, illus.

Measurements were taken of daily variations in soil temperature and air temperature near ground level in a cultural trial field of strawberries. The air temperature 10 cm. above ground level on a clear summer's day was about 2° C. higher than that 200 cm. above ground level, but was about 1° C. lower during the night. Strawing too early in the spring tended to delay ripening of berries. Soil temperature was related to plant density; with runner removal soil temperatures were significantly increased on a bright day. Soil temperatures were reduced 8 and 12 days after irrigation owing to increased evaporation from the soil surface. Soil temperatures at a depth of 5 cm. were significantly lower under straw both at night and during the day. Daily temperature variations decreased with increasing soil depths, and this effect was increased by a straw cover.—Stat. Forsøksgard, Kise.

2258. Thorsrud, J.
Dyrkingsforsøk med jordbær. I. Sammenlikning mellom forskjellige dyrkingsmåter. II. Virkningen av avranking, halmdekking og vatning. **(Cultural trials with strawberries. I. A comparison of spaced and matted systems. II. The effect of runner removal, strawing and irrigation.)** [English summary 1 p.]
Forskn. Landbruk., 1958, **9**: 23-7, bibl. 5.

Single and matted rows and beds of spring-planted Abundance strawberries were compared for yield and quality in cultural trials. In the first year of cropping, yields from the single spaced row system equalled those from matted rows, but they were lower in the second year and particularly in the third year. This yield reduction is attributed to increasing age of the plants, which is accompanied by reduced cropping ability and winter hardiness. The author, however, recommends the single plant system for growing Abundance, because of its advantage in management and the increase in berry size due to runner removal. The bed systems gave the highest yields of the systems tested, but cannot be recommended commercially because of increased production costs. Runner removal gave an increase in berry size almost every year. Fruiting started later as plant age increased. Strawing in combination with runner removal and irrigation increased yield, berry size and quality. Irrigation was applied only in a very dry season and had a marked effect on yield, berry size and fruit quality. There was an indication that floral initiation was affected by irrigation, so that flowering and fruiting in the following year were delayed.—Stat. Forsøksgard, Kise.

2259. V., G.
Glas en plastik voor het vervroegen van aardbeien. **(Glass and plastic for forcing strawberries.)**
Cult. Hand., 1958, **24**: 37-8, illus.

Some aspects of forcing strawberries in the field are discussed. Strawberries forced under glass may be as much as 6 days earlier than those forced under plastic. Covering the plants from the end of January or early March gave higher yields than later covering.

Vines.

(*See also* 2059, 2097, 2099, 2150, 2188, 2301e-i, k, n-p, r, t, v, 2302c, d.)

2260. Levadoux, L.
Le popolazioni selvatiche e coltivate di *Vitis vinifera* L. **(Wild and cultivated populations of *Vitis vinifera*.** [English and German summaries ⅓ p. each.]
Riv. Vitic. Enol., 1957, **10**: 366-74, 401-12, 427-36, bibl. 83.

The relationship between wild (*silvestris*) and cultivated (*sativa*) forms of grapevine is examined morphologically, historically and geographically.

2261. Lebedeva, L. Ja.
Biological characteristics of the Amur vine, growing wild and cultivated in the Primorsk region. [Russian, with French summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 51-72, bibl. 24, illus.

The Amur vine (*Vitis amurensis*) is notable for its frost resistance, early ripening and regular bearing. The sugar content of the grapes is low, namely 10–12%, though in both wild and cultivated plants forms with 14–16% sugar content occur. Under cultivation the plants were found to be more vigorous and frost resistant, producing a higher yield of better quality, than in the wild state. Selection work resulted in the development of some valuable forms suitable for cultivation or further selection, of which Nos. 230, 224 and 226 are recommended for immediate introduction.

2262. Negrul', A. M.
The wild vine of the Crimea and its relationship to local varieties. [Russian, with French summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 39-50, bibl. 17, illus.

From a study of the seeds of the wild vine (*Vitis vinifera* ssp. *silvestris*), including those obtained from archaeological excavations and those from local vineyards, the author concludes that there is a true wild vine in the Crimea. In addition, especially on the south coast, a vine which has escaped from cultivation occurs. Among local varieties, numbering over 60, there are some with seeds resembling those of the wild Crimean vine and which were probably in existence during or before the period of Greek colonization.

2263. Ajvazjan, P. K.
Variability of vine seedlings caused by grafting. [Russian.]
Agrobiologija, 1958, No. 1, pp. 76-85, illus.

Morphological, physiological, biochemical and anatomical changes were observed in hybrid seedlings grafted on different rootstocks. In most cases wild phylloxera-resistant rootstocks had a greater influence on the seedlings than rootstocks of cultivated varieties. Of the characters studied pubescence, shoot and leaf colour and vigour were the most readily affected, followed by leaf serration, course of phenological phases and the resistance of berries to rotting, their colour and flavour. Characters least influenced were the sex of the flowers and resistance to frost and mildew.

2264. Prostoserdov, N. N., and Krasnokutskaja, S. V.
Application of yeast in new vine plantations of the Fruit Experiment Station of the Timiryazev Agricultural Academy. [Russian, with French summary ¼ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 161-8, bibl. 18.

Spraying with suspensions of *Saccharomyces ellipsoideus* is necessary in vineyards planted in areas not previously used for wine production, owing to the absence of natural yeasts in the soil and on the plants.

2265. Arhangel'skaja, V. V.
The effect of temperature conditions on the frost resistance of vines. [Russian, with French summary ¼ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 103-22, bibl. 16, illus.

In northern regions the growth and development of the vine in the summer and its winter hardiness depend on temperature conditions during the vegetative period. In experiments with mature vines grown against a wall and in the open and with cuttings raised in the greenhouse, frame and open ground it was found that high temperatures hastened all growing processes, resulting in well matured wood and hardy plants. The optimum air and soil temperatures for the cuttings were 20–25° C. and 18–20° C. respectively during rooting, 25–30° C. and 15–20° C. respectively during active growth and 15–20° C. [soil temperature?] with reduced soil moisture content in early autumn.

2266. Motorina, M. V.
Photosynthesis and respiration of vines under conditions of the Moscow region. [Russian, with French summary 8 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 123-40, bibl. 46.

In the Moscow region the photosynthetic and respiratory activities of the vine are very great. Maximum photosynthesis was found to occur at a temperature of 22–30° C., light intensity 20,000–30,000 lux and relative humidity 60–70%. Varieties showed differences according to their place of origin, northern varieties such as Alfa (*Vitis labrusca* × *V. riparia*) and the Amur vine (*V. amurensis*) starting photosynthesis at light intensities and temperatures much below those required for the southern variety Černyj sladkij (*V. vinifera*). Diurnal and seasonal variations in respiration were recorded.

2267. Grečišnikov, I. P.
The response of vines to light conditions in the Moscow region. [Russian, with French summary 8 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 141-6, bibl. 11.

The rate of growth of young and mature plants decreased sharply 10 days after the start of short-day treatment; the shoots started to mature rapidly and vegetative growth was greatly reduced. Reaction to reduced day length varied with origin of the variety, southern varieties reacting most readily. An 8-hour-day treatment for 30 days had no appreciable effect on fruit ripening.

2268. Swanson, C. A., and El-Shishiny, E. D. H.
Translocation of sugars in the Concord grape.
Plant Physiol., 1958, 33: 33-7, bibl. 21, illus.

On the basis of radiochemical analyses, it was concluded that sucrose was the only form of sugar rapidly translocated in the grape cane. The C-14 label was introduced by supplying $C^{14}O_2$ to a single leaf on the cane under conditions favorable for photosynthesis. Appreciable quantities of labeled-glucose and -fructose were also found in the stem, but these appeared to be hydrolytic products of the translocatory sucrose, as inferred from the fact that the ratio of glucose-C-14 to fructose-C-14 approximated unity. These results accord with the data reported in the literature showing the complete absence of glucose and fructose, and the predominance of sucrose, in the sieve tubes of a considerable number of species (based on chromatographic analyses of the sieve tube exudate from these species). The convergence in results obtained by these disparated approaches provides supplementary evidence that the translocation of sugars occurs primarily in the sieve tubes or sieve cells of the phloem tissue. [Authors' summary.]—Ohio St. Univ., Columbus.

2269. NEGRUL', A. M., AND NIKIFOROVA, L. T.
Some interrelations between different organs of vines. [Russian, with French summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 73-84, bibl. 17, illus.

The relationship between different organs of the vine variety White Muscat was studied by means of isolation through ringing, defoliation and the removal of young fruit. It was found that plastic substances were translocated into a fruiting shoot from another shoot growing on the same or on a different branch, from laterals of a different shoot or from the roots. Assimilates from one shoot were translocated into another defoliated fruiting shoot. Fruiting shoots compared with vegetative shoots showed better wood maturity and photosynthetic activity of the leaves, and produced a greater number of fruiting shoots the following season.

2270. GAVAKETAŠVILI, A. G.
New hybrid forms of phylloxera-resistant vine rootstocks. [Russian.]
Soobšč. AN GruzSSR, 1956, **17**(6): 503-7, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,336.

In Georgia 3 local vine varieties were crossed with the phylloxera-resistant rootstocks, Riparia Gloire and Berlandieri × Riparia. Out of 4,000 hybrid seedlings 5 were found to be more suitable as rootstocks than the widely used Berlandieri × Riparia 5BB.

2271. LIDER, L. A.
***Phylloxera*-resistant grape rootstocks for the coastal valleys of California.**
Hilgardia, 1958, **27**: 287-318, bibl. 25, illus.

In extensive trials, the experimental stock Aramon × Rupestris Ganzin 1 was the most vigorous and productive of those tested. Rupestris St. George, the most popular commercial stock, is not considered the most suitable under the conditions of the test.

2272. GAPRINDAŠVILI, G. V.
The effect of rootstocks on the productivity and quality of vines. [Russian.]
Sad i Ogorod, 1958, No. 2, pp. 75-6.

Experiments in Georgia with 6 vine varieties and 4 rootstocks have shown that individual varieties yielded best on particular rootstocks, and that the sugar content of the juice was usually highest where the yields were the highest.

2273. STOVER, L. H.
Cleft grafting grapes with polyethylene and sphagnum moss.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 300-2.

About 50% take was obtained in cleft grafts covered with damp sphagnum moss and polythene, in spite of the grafts receiving less care than normal. Both young transplants and old oversized stumps were included in the test.—Fla agric. Exp. Stats, Leesburg.

2274. SAMISH, R. M., AND SPIEGEL, P.
The influence of the nutrition of the mother vine on the rooting of cuttings.
Ktavim, 1958, **8**: 93-100, bibl. 24.

The effect of fertilization of Chasselas × Berlandieri 41B stock plants on the rooting of cuttings after grafting with Muscat-Hamburg has been studied. Nitrogen reduced weight per unit length of canes, but had no other harmful effect. Phosphorus and K alone had no apparent effect on rooting or quality, although their contents in the canes increased. Complete NPK fertilization increased starch content and rooting percentages and also improved the quality of the young plants. Tryptophan contents were increased by complete fertilizer or Zn treatments, and it is suggested that increased auxin production from accumulated tryptophan may explain the beneficial effects of these treatments.

2275. DOLL, C. C.
Grapes: looking underground.
Amer. Fruit Gr, 1958, **78**(5): 16, 18, illus.

Root excavation of Concord vines in a terraced vineyard in Iowa showed that, on fertile soil, vines spaced 8 × 10 ft. had a maximum root extension of 22 ft. and vertical penetration was 14·5 ft. The heaviest concentration of feeder roots was in the surface foot, but a dense network of roots had penetrated the upper 6 ft. On less fertile soil the horizontal root growth was 24·2 ft., but vertical penetration was only 9·5 ft. and most feeder roots were in the surface layer. Shallow cultivation and band placement of fertilizers is recommended.

2276. MILELLA, A.
Ricerche sui sistemi radicali della vite in Sardegna. (**Studies on vine root systems in Sardinia.**)
Studi sassaresi, Sez. III, 1956, **4**: 145-51, bibl. 22, illus. [received 1958].

In the arid zone concerned, the maximum ploughing depth before planting should be 60 cm. and the vines should be planted at greater distances apart than the 0·75 m. × 1 m. traditionally used.

2277. GABOVIČ, V. I.
Cultivation practices in northern vineyards in relation to the development of the root system of vines. [Russian, with French summary ½ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 85-102, bibl. 7, illus.

In the Moscow region, the development of the root system of the vine is limited by soil conditions, the bulk of the roots appearing in the horizons most favourable for development. The reduction of fertility at a depth below 30–40 cm. in clay soils has a deleterious effect on root and plant development. The roots of the varieties Alfa and Chasselas were found to start growth at soil temperatures of 8–10° and 10–12° C. respectively, begin to branch at 9–10° and 13–14° C. and cease growing at 6–7° and 7–10° C. In both varieties the period of root growth was 2 months longer than that of shoot growth. To create optimum conditions for root growth recommendation are made on methods of cultivation in different soil types, on manuring and on irrigation.

2278. Litvinov, P. I.
Increasing the productivity of vines by root treatment. [Russian.]
Sad i Ogorod, 1958, No. 4, pp. 69-73, illus.

A significant increase in the vigour of the root system of vines was produced by cultivating alternate interrows to a depth of 55–60 cm. in one autumn and the remaining interrows in the following autumn to a distance of 50 cm. from the vines. In the 3rd and 4th years this treatment was repeated to a distance of 80 cm. from the vines. With each cultivation a dressing of 100 kg. N, 150 kg. P, 100 kg. K and 25 centners of humus was applied and the roots were pruned. Yields began to increase during the first year following the treatment and subsequently were 25–50% higher than those of the controls. [See also *H.A.*, 26: 2552.]

2279. Archibald, J. A.
The effect of various organic soil amendments on growth and yield of grapes, and on soil physical and chemical properties.
Bienn. Rep. hort. Exp. Stat. Vineland 1955 and 1956, pp. 31-7, bibl. 8.

The red wine grape variety Agawam failed to respond to fertilizers on a clay loam soil of poor physical condition. The response to synthetic conditioners of the Krilium type was fairly rapid, but did not persist. A single soil incorporation of 5 tons of sawdust per acre increased the average annual yield over the next 5 years by 3·4 lb. per vine, the corresponding increase from the same weight of straw being 2·8 lb. and that from lucerne meal 2·1 lb. Application of grape pomace (wine-making residue) did not increase yield, neither did paper-mill wastes nor sugar.

2280. Cincadze, D. N.
The effectiveness of green manures in vineyards of Kahetia. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18**(2): 20-1.

On vineyards fertilized with NPK, vetch and pea sown in September and turned under in early spring increased yields and suppressed weeds.

2281. Petrosjan, G. P.
The value of lucerne in the reclamation of saline soils. [Russian, with Armenian summary.]
Izv. AN ArmSSR, Biol. i s-h. N., 1956, **9**(12): 77-89, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 81,976.

In Armenia saline soils were reclaimed for vineyards by sowing lucerne. The stand of lucerne shading the soil reduced the capillary rise of mineralized ground water, and copious irrigations washed the salts into the ground water, preventing further salinization. Vines planted on soil shaded with lucerne grew and developed normally.

2282. Gorev, L. N.
The use of soils with high ground water for vines. [Russian.]
Vinodelie i Vinogradarstvo, 1958, 18(1): 23-5.

In certain regions of Uzbekistan the vine is grown successfully on soils in which ground water in the spring rises to within 50–60 cm. of the soil surface. The water table is usually highest in March–April and lowest in October–November, the fall starting in July–August, at the time of intensified accumulation of sugars in the grapes. Under conditions of high water table and chloride-sulphate type salinity, treatment of the cuttings with heteroauxin plus potassium chloride has given good results by increasing the resistance of plants to those conditions. Varieties suitable for soils with a high water table and various levels of salinity are recommended. Cuttings for vines to be grown on saline soils should be taken from mother plants grown in soils of equivalent salinity and raised in nurseries on similar soil types.

2283. Lelakis, P.
Sur un nouvel optimum expérimental de l'alimentation de la vigne déterminé par le diagnostic foliaire basé sur l'analyse des feuilles prélevées au niveau des grappes (4^e et 5^e noeuds). **(A new experimental optimum for vine nutrition calculated by leaf analysis using leaves at bunch level (4th and 5th nodes).)**
C.R. Acad. Agric. Fr., 1958, **44**: 221-4.

Optimum levels for N, P and K have been calculated for the 4th and 5th leaves of a fruiting shoot. These are preferred to the 1st and 2nd leaves for sampling as the latter may be removed during defoliation and are also frequently attacked by parasites.

2284. Aldebert, P.
Les courbes de référence, pour l'application du diagnostic foliaire en Algérie. **(Curves of reference for application of foliar diagnosis [to vines] in Algeria.)**
Bull. Off. int. Vin, 1958, **31**(326): 19-23.

The norms for foliar diagnosis in vines in France, established by Lagatu and Maume, were applied in 3 consecutive years in Algeria to vineyards ranging in age from 6 to 24 years, on soils relatively poor in P. In general the curves recording variations of foliar N and P throughout the growing season agreed with those for French vines, but they showed a more rapid and pronounced falling off during fruit ripening. Curves for foliar K, however, were consistently lower, even for vines in excellent condition, growing in soils of good K status. Compared with the N : P_2O_5 : K_2O balance of 52 : 10 : 38, regarded as optimal in French vine leaves, the Algerian vines of the plains averaged 58 : 13 : 29 and those of the hills 54 : 12 : 34. In general, the higher proportions of K were associated with the best fruit yields. Soil levels of both N and K were more closely correlated with foliar values than those of P.

2285. Vega, J., Magni S., C. J., and Fox, J. M.
Efectos de abonos nitrogenados, fosfatados y potásicos en el viñedo. **(Effects of nitrogen, phosphate and potash manures on vines.)**
Idia, 1957, No. 118, pp. 19-32, bibl. 9.

The yield response of vines growing in sandy loam of pH 8 was high to P (which had a 3-year residual action), moderate to N and negligible to K. The sugar content of the fruit, however, was increased by K. All 3 nutrients improved the vegetative growth.

2286. Najdenov, L. N.
The control of sugar accumulation in vines by fertilizers. [Russian.]
Sadov. Vinograd. i Vinodelie Moldavii, 1956, No. 5, pp. 23-5, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,325.

In northern Moldavia late vine varieties do not always mature fully. Supplementary soil applications of P_2O_5 and K_2O and also foliar applications of B and superphosphate greatly increased the sugar content of the grapes. The soil treatments also improved wood maturity.

2287. Depardon, L., and Buron, P.
Fumure potassique de la vigne. **(Potassium fertilizing of vines.)**
Ann. agron., 1957, **8**: 724-5.

The sugar content of grape must was raised progressively by increasing the application of K to vine soils from O to 100, 150 and 200 kg. of K_2O per ha., but excessive application induced an unfavourable ratio of tartaric acid to K.

2288. Lužeckij, S. N.
A study of foliar nutrition of vines combined with bordeaux treatment. [Russian, with French summary ⅓ p.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 153-60, bibl. 13.

Methods are described for combining a foliar nutrient solution, containing P, K and B, with bordeaux to ensure the proper functioning of both.

2289. Dobroljubskij, O. K., and Slavvo, A. V.
Variations in certain redox processes in the vine under the influence of trace elements. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 1064-7, bibl. 11.

Applications of Zn, Co, Cr and Ni increased peroxidase and polyphenoloxidase activity, and resulted in the advancement of maturity and an improvement in yield and quality.

2290. Weaver, R. J.
Effect of gibberellic acid on fruit set and berry enlargement in seedless grapes of *Vitis vinifera*.
Nature, 1958, **181**: 851-2, bibl. 8.
Weaver, R. J., and McCune, S. B.
Gibberellin tested on grapes.
Calif. Agric., 1958, **12**(2): 6-7, 15, illus.

Berry size of Black Corinth vines was increased after flowering clusters had been dipped in solutions of 5–500 p.p.m. gibberellic acid. In treated clusters the percentage of total soluble solids remained the same, but total acids were decreased. After spraying Thompson Seedless vines at the berry shatter stage with 20 and 50 p.p.m. gibberellic acid cluster and berry size were increased. Sprays of 5 p.p.m. gibberellic acid were less effective than girdling. Stem elongation and accelerated flowering were also observed after gibberellic acid treatment. Berry size was not appreciably affected by gibberellic acid in seeded varieties.

2291. Stewart, W. S., Ching, F. T., and Halsey, D. D.
Effects of gibberellic acid sprays on Thompson Seedless grapes.
Lasca Leaves, 1957, **7**: 80, bibl. 1, illus.

A single application of either 10 p.p.m. or 100 p.p.m. gibberellic acid as an aqueous spray to flower clusters resulted in fruit bunches about 50% larger than normal, irrespective of whether or not the vines had been girdled and the flower cluster hand-thinned. The grapes on treated bunches were up to twice as long as, and slightly greater in diameter than, those from untreated clusters, and showed increased sugar and decreased acid content. Application of 100 p.p.m. spray weekly for 4 consecutive weeks increased the percentage of undeveloped grapes per bunch. The one Perlette vine tested responded similarly.

2292. Weaver, R. J., and McCune, S. B.
Response of Thompson Seedless grapes to 4-chlorophenoxyacetic acid and benzothiazol-2-oxyacetic acid.
Hilgardia, 1957, **27**: 189-200, bibl. 7, illus.

Leaf applications of 4-chlorophenoxyacetic acid (4-CPA) increased berry size in Thompson Seedless grapes, the maximum effect being obtained in combination with dipping the clusters. In some of the experiments 4-CPA caused a slight delay in maturation. Sprays of 4-CPA had little or no effect on berry size of heavily overcropped vines of Thompson Seedless. Applications of benzothiazol-2-oxyacetic acid (BOA) at 5 to 10 p.p.m. usually retarded maturation, although high quality fruit developed. Higher concentrations resulted in some misshapen leaves and sometimes in inferior fruit. Applications of BOA on July 11 delayed maturation of fruit to a greater extent than sprays applied later. BOA sprays applied on June 10 retarded maturity by about 19 days and percentage of total soluble solids of sprayed fruits never reached that of unsprayed fruits.

2293. Anon.
Table grapes. Harvest control possible?
Fmg S. Afr., 1958, **34**(1): 6-8, illus.

Sprays of 2,4-D and 2,4,5-T at 5 p.p.m. were applied to Alphonse Lavalle and Waltham Cross 2, 4 or 6 weeks before harvest. Maturation in Alphonse Lavalle was delayed by 5–10 days depending on the time of spray application. Growth regulator sprays are not recommended for Waltham Cross since, although ripening was delayed, many berries remained underdeveloped or shrivelled.

2294. Malan, A. H.
Double stem system has many advantages.
Fmg S. Afr., 1958, **33**(12): 10-13, illus.

Promising results have been obtained with a double stem system of pruning applied to 3 grape varieties. Rapid development of the framework allows a reasonable crop of good quality to be borne in the third summer.—W.P. Fruit Res. Stat., Stellenbosch.

2295. Kondarew, M.
Elementare Probleme beim Formieren und Schnitt der Rebstöcke in den bulgarischen Weinbaugebieten. **(On the training and pruning of vines in the vineyards of Bulgaria.)** [English, French and Spanish summaries 8–9 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 320-27, bibl. 3.

Experiments showed that vines trained according to the Guyot method gave greatly superior yields to those trained in cup shape. The results were originally obtained with table grapes and later confirmed for wine varieties.—Agric. Coll. Wassil Kolarow, Plovdiv.

2296. LAMOURIA, L. H., AND OTHERS.
Designing a grape harvester.
Agric. Engng St. Joseph, Mich., 1958, **39**: 218-21, 36, bibl. 7, illus.
The machine is described in detail with the aid of diagrams [see also *H.A.*, 26: 3455]. It was designed to be used in vineyards trellissed to allow the clusters to hang free below the wires. Harvest efficiency was found to be a direct function of bunch stem length and varied, in 4 varieties, from 83·4% to 95·6% harvested. The design speed was 1·5 m.p.h., which would allow 14 acres of raisins or 17 acres of wine grapes to be harvested per day. With 1 driver-operator this would give a man-power advantage of 70 : 1 or 63 : 1 respectively over hand harvesting.

Nuts.

(*See also* 2188, 2301a-c, l, m, s, u, w, 3206, 3222.)

2297. DEL GAUDIO, S.
Ibridazione del mandorlo. (**Hybridization of almonds.**) [English, French and German summaries 6–7 lines each.]
Frutticoltura, 1958, **20**: 145-55, bibl. 11, illus.
Intervarietal almond hybrids were generally little affected by leaf curl, but almond × apricot hybrids were moderately, and almond × peach hybrids highly, susceptible. The fruits of several hybrids are described.

2298. BREVIGLIERI, N.
Ricerche sulla biologia fiorale e di fruttificazione della *Castanea sativa* e *Castanea crenata* nel territorio di Vallombrosa. (**Studies on the floral biology and fruiting of *Castanea sativa* and *C. crenata* in the region of Vallombrosa.**) [French, English and German summaries 8, 8 and 10 lines.]
Pubbl. Centro Stud. Castagno, 1951, No. 1, pp. 15-49, bibl. 51, illus. [received 1958].
The onset and duration of flowering are compared for 5 chestnut varieties, and results of pollination experiments are given. Parthenocarpy, apogamy and carpoxenia in chestnuts are discussed.

2299. BAGNARESI, U.
Osservazioni morfo-biologiche sulle provenienze di castagno giapponese coltivate in Italia. (**Morphological and biological observations on the progeny of Japanese chestnuts cultivated in Italy.**) [French, English and German summaries 9 lines each.]
Pubbl. Centro Stud. Castagno, 1956, No. 3, pp. 7-48, bibl. 26, illus. [received 1958].
Chestnut seed imported into Italy from Japan gave rise to variable populations in which 2 main groups were evident. The first, showing most of the characteristics of *Castanea crenata*, grows well in Italy and produces better quality nuts than indigenous trees, provided it has good soil, a mild climate and rather wide spacing. The second type, formerly termed Shiba or Timba, is similar to the native *C. sativa*, but is more robust, can be planted more densely, and is mainly a forest type.

2300. WHITEHOUSE, W. E.
The pistachio nut—a new crop for the western United States.
Econ. Bot., 1957, **11**: 281-321, bibl. 45, illus.
A comprehensive account including information on origin and distribution, varieties, propagation, detailed description of 8 rootstocks, management, pollination requirements, diseases and pests, harvesting and marketing, and uses including resin and turpentine. —U.S. Dep. Agric.

Noted.

2301.

a BORELLI, O., AND OTHERS.
Studio monografico sul castagno nella provincia di Lucca. (**Monograph on chestnuts in the province of Lucca.**) [French, English and German summaries 1 p. each.]
Pubbl. Centro Stud. Castagno, 1958, No. 4, pp. 175, bibl., illus.

b BREVIGLIERI, N.
Ricerche sulla disseminazione e sulla germinazione del polline nel castagno. (**Studies on dispersal and germination of chestnut pollen.**) [French, English and German summaries ⅓ p. each.]
Pubbl. Centro Stud. Castagno, 1955, No. 2, pp. 5-25, bibl. 9, illus. [received 1958].

c BREVIGLIERI, N.
Indagini ed osservazioni sulle migliori varietà italiane di castagno (*Castanea sativa*, Mill) (Primo contributo). (**Investigations and observations on the best Italian varieties of chestnut (*Castanea sativa.*) (First contribution).**) [French, English and German summaries ½ p. each.]
Pubbl. Centro. Stud. Castagno, 1955, No. 2, pp. 27-166, bibl. 30, illus. [received 1958].

d CAMPBELL, R. W., AND AMSTEIN, W. G.
Growing strawberries in Kansas.
Circ. Kansas agric. Exp. Stat. **317**, revised 1957, pp. 29, illus.
Cultural instructions.

e CLORE, W. J., AND BRYANT, L. R.
The effect of certain climatic factors on the growth, production and maturity of the Concord grape.
Proc. Wash. St. hort. Ass., 1957, pp. 92-4.
Frost damage and yield; temperature records and ripening.

f CONSIGLIO, P.
Le uve da tavola in Puglia. (**Dessert grapes in Apulia.**)
Riv. Vitic. Enol., 1958, **11**: 75-82, 116-28 bibl. 10, illus.
History, varieties, production and trade.

g Cosmo, I., Polsinelli, M., and Ciribì, A.
Indagini sulla ricostituzione viticola delle Venezie ai fini dell'orientamento per i futuri impianti. Risultati della sperimentazione compiuta sui vitigni europei da vino e sui portinnesti in provincia di Belluno a decorrere dal 1923. **(Studies on the reconstitution of vineyard in the Venice area preliminary to future planting. Results of experiments involving European wine grapevines and rootstocks in the Belluno province from 1923 onward.)** [English summary 8 lines.]
Ann. Sper. agrar., 1958, **12**: 55-102, bibl. 4, illus.

h Datrut, R.
Le greffage des Jacquez en Ardeche. **Reworking Jacquez vines in Ardeche.)**
Progr. agric. vitic., 1958, **149**: 137-40, 161-3, illus.
Successful soil-level grafting to another variety.

i Durmišidze, S. V.
Vitamin P in grapes and wine. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18**(2): 15, bibl. 3.
Grapes contain 500–1,000 i.u. of vitamin P per 100 g. dry matter.

j Filmer, R. S.
Cranberry pollination studies.
Proc. annu. Conv. Amer. Cranberry Grs' Ass., 1953, **84**: 28-36, from abstr. in *Bee World*, 1958, **39**: 107.
Yields increased by increasing the number of bee colonies per acre.

k Furner, B. G.
Report on trials of Labruscan grapes.
J. roy. hort. Soc., 1958, **83**: 179-81, illus.
In N.W. Kent.

l Gerritsen, C. J.
De tamme kastanje een fruitgewas? **(Sweet chestnut as a fruit crop?)** [English summary 19 lines.]
Meded. Dir. Tuinb., 1958, **21**: 90-3, bibl. 8, illus.
Advantages and disadvantages for the Netherlands discussed.

m Kalmykov, S. S.
Fruit forests of the Bostandyksk region. [Russian.]
Soc. s. h. Uzbekistana, 1956, No. 10, pp. 49-51, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,798.
Some 40 fruit species occur, walnut and almond being the most important.

n Klingbeil, G. C., Wade, E., and Dever, D.
Growing grapes in Wisconsin.
Circ. Wis. agric. Ext. Serv. **539**, 1957, pp. 8, illus.
Advice on varieties, culture, pruning, and control of pests and diseases.

o Konlechner, H.
Ergebnisse von Arbeitsversuchen mit dem Steyr-Schmalspurtraktor 80s. **(Results of work trials with the Steyr narrow-track tractor 80s.)** [English, French and Spanish summaries 12–14 lines each.]
Mitt. Klosterneuburg, Ser. A, 1958, **8**: 57-80, illus.
Very satisfactory for vineyard cultivation.

p Lelakis, P.
Induction de la polyploidie chez *Vitis vinifera* L. par application de la colchicine. **(The induction of polyploidy in *Vitis vinifera* by colchicine application.)**
Ann. Éc. Agric. Montpellier, 1957, **30**: 3-97, bibl. 86, illus.
Experience with 10 varieties described.

q McCloskey, G. T.
Progress report of marketing tests of blueberry variety keeping qualities.
26th annu. Blueberry Open House, N.J. agric. Exp. Stat., 1958, pp. 8-14.
Six varieties compared.

r Mel'nik, S. A.
Achievements of viticulture in the U.S.S.R. [Russian.]
Agrobiologija, 1958, No. 1, pp. 109-16.
During the past 40 years.

s Milella, A.
La coltura del mandorlo in Sardegna. **(Growing almonds in Sardinia.)**
Studi sassaresi, Sez. III, 1956, **4**: 32-43, bibl. 7 [received 1958].

t Mininberg, S. Ja.
The effect of soil nutrition on the productivity and frost resistance of vines. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **23**(2): 26-30.
Mn applied as potassium permanganate at 1·5 g. per vine with NPK increased vigour, yield, quality and frost resistance.

u Morettini, A., and Saccardi, A.
Le varietà di castagni da frutto coltivate nel Monte Amiata. **(Chestnut varieties cultivated in Monte Amiata.)** [English, French and German summaries 4 lines each.]
Pubbl. Centro Stud. Castagno, 1951, No. 1, pp. 51-68, bibl. 1, illus. [received 1958].

v Negrul', A. M.
The work of the department of viticulture of the Timiryazev Agricultural Academy reviewed on the occasion of the 40th anniversary of the great October socialist revolution. [Russian, with French summary 2 lines.]
Izv. Timiryazev. seljsk. Akad., 1958, No. 1, pp. 35-8, bibl. 28.

w PAVARI, A., BIRAGHI, A., AND BREVIGLIERI, N.
L'attività della Commissione Internazionale del Castagno. **(The function of the International Chestnut Commission.)** [French, English and German summaries ½ p. each.]
Pubbl. Centro Stud. Castagno, 1956, No. 3, pp. 49-74 [received 1958].

x PETRAHILEV, I. M.
Interspecific hybrids of raspberry. [Russian.]
Agrobiologija, 1958, No. 1, pp. 138-40.
Frost resistant forms of Siberian red raspberry × Marlboro'.

y PRATT, A. N.
Strawberry grader.
Amer. Fruit Gr, 1958, **78**(5): 13, illus.
A home-made device with which 1 operator can do the work of 4 or 5 pan graders.

z RAPHAEL, T. D.
Black currants in Tasmania.
Tasm. J. Agric., 1958, **29**: 5-12, illus.
Culture and varieties.

2302.

a SASAKI, S., AND SATO, T.
Results of strawberry breeding. II. On three newer strains. [Japanese, with English summary ½ p.]
Reps Tohoku nat. agric. Exp. Stat., 1957, No. 11, pp. 74-7, bibl. 1, illus.
Descriptions of 3 hydrids bred from Fairfax, Dorsett and Progressive. [For Part I, see *H.A.*, 27: 3240q.]

b SUZUKI, I., SUGAHARA, Y., AND TODAKA, S.
New strawberry variety, "Kôro". [Japanese, with English summary ½ p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1957, No. 4, pp. 27-35, bibl. 4, illus.
A high-yielding variety (Improved Marshall × Fairfax), with good market and processing qualities.

c TROICKIJ, E. P.
The relative content of some microelements in soil, vine and wine. [Russian.]
V Sb.: Mikroèlementy v S. H. i Medicine, Riga, AN LatvSSR, 1956, pp. 379-88, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,404.
Determinations of B, Ti, V, Mn, Mo, Cr and Ra in different varieties grown in different regions.

d WEBB, A. D., AND KEPNER, R. E.
Volatile aroma constituents of *Vitis vinifera* var. Muscat of Alexandria.
Food Res., 1957, **22**: 384-94, bibl. 25, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-78.

e WIELOCH, E., AND SORGE, P.
Die Verwertung der Schwarzen Johannisbeere unter Berücksichtigung der Sorten. **(The value of different blackcurrant varieties.)**
Dtsch. Gartenb., 1958, **5**: 43-6.
Preservation qualities of Rosenthal Schwarze, Silvergieters Schwarze and Goliath.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 2448i, p, w, 2449m, 2461-2467, 2511a, 3189.)

2303. MAURI, N.
Parasitologie agricole en Afrique du Nord. **(Agricultural pests and diseases in North Africa.)**
Fruits et Prim., 1957, **27**: 297-390.

This whole number of *Fruits et Primeurs* is devoted to the identification and control of pests and diseases of agricultural crops in North Africa. Identification is by a list of symptoms and by an artificial key. The various diseases and pests are then described and a control treatment recommended for each. Details of 130 different treatments are given followed by a list of suitable periods of the year for application.

2304. BRANDTNER, E.
Methodische Untersuchungen an phänologischen Beobachtungen unter besonderer Berücksichtigung phytopathologischer Probleme. **(Methodical studies of phenological observations with special reference to phytopathological problems.)** [English abstract 33 lines.]
Ber. dtsch. Wetterdienst. **47**, 1958, pp. 14+ appendix, bibl. 30.

Phenological data for a certain area in Western Germany are evaluated statistically. It is shown how phenological observations may help to time sprays against pests and diseases, with brief references to cabbage root fly, apple scab, fire blight, fruit tree red spider and others.

2305. BOBB, M. L., AND HURT, R. H.
Peaches.
Res. Rep. Va agric. Exp. Stat. 1953–1957, 1957, pp. 203-8, illus.

Pests [see also *H.A.*, 26: 2670c and 28: 303]: A pink-bud and a petal-fall spray of dieldrin or DDT have given excellent control of insects causing catfacing. Plum curculio (*Conotrachelus nenuphar*) has been most effectively controlled by dieldrin, with good results from 3 phosphate materials (parathion, EPN and guthion). Effective control of peach tree borer (*Sanninoidea exitiosa*) has been obtained by spraying tree trunks with DDT twice during the oviposition period; other promising insecticides for control were parathion, BHC and dieldrin. Parathion has given the best control of the lesser peach tree borer (*Synanthedon pictipes*) in preliminary tests. Both first and second brood sprays were necessary for effective control of oriental fruit moth (*Grapholitha molesta*); DDT has been the most satisfactory insecticide. Parathion applied for plum curculio control has also effectively controlled San José scale. *Diseases:* The most effective spray combination for control of bacterial shot-hole is zinc-lime with glyodin or wettable sulphur, applied at petal fall and continuing at weekly intervals for at least 4 applications. Results of field trials have shown that dichlone either with wettable S or with glyodin is effective in the control of the early stages of brown rot. Constriction canker disease (*Fusicoccum amygdali*) has recently appeared in the United States, and present control recommendations are: several sprays of dichlone plus glyodin applied in summer with autumn treatments of dichlone, ferbam and glyodin. Peach leaf curl has been more effectively controlled by lime sulphur, bordeaux mixture, ferbam and dichlone applied in November than in the spring.

Disturbances of nutrition or of unknown origin.

(*See also* 2223, 2224, 2229-35, 2282, 2448a, l.)

2306. Shear, G. M.
Boron in relation to apple production.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, p. 191.

Wet digestion procedures were much more reliable than ashing in the analysis of plant tissue for B. Internal cork resulting from B deficiency was found in fruits of several apple varieties; the amount, appearance and distribution varied with variety. In general deficient fruits contain less than 8 p.p.m. B, while deficient leaves contain less than 25 p.p.m. The value of determining B content of leaves and fruits with a view to anticipating deficiency is still doubtful.

2307. Righi, R.
La borocarenza del pero. **(Boron deficiency in pears.)**
Riv. Ortoflorofruttic. ital., 1958, **42**: 51-5, bibl. 4, illus.

Symptoms are described for fruits, flowers, leaves, buds, branches and trunk. Susceptible varieties are listed. The deficiency is cured by working in 10 g. of borax per sq. m. of soil under the crowns of the trees, or, in grassed orchards, by injecting 5% borax solution to a depth of 25 cm. at the same rate, in autumn or early spring. Where the soil is alkaline a 0·5% foliar spray is used before, during and after flowering, allowing 10 g. of borax per sq. m. This treatment can be combined with fungicide application. Slight cases are cured within a year, severe cases respond more slowly.

2308. Sauer, M. R.
Boron content of sultana vines in the Mildura area.
Aust. J. agric. Res., 1958, **9**: 123-8, bibl. 7, illus.

Boron contents of sultana vines on Mallee soils are high and show some relation to soil type, being highest on loam soils and lowest on sands. Toxicity occurs in leaves containing 300 p.p.m. B or more, and leaf symptoms of toxicity are described. Adequate drainage is important in keeping B concentrations below toxic levels. There are indications that applications of sulphate of ammonia and superphosphate tend to increase B levels in sultana leaves.—Commonw. Res. Stat., Merbein, Victoria.

2309. Chabannes, J., Duprat, A., and Trocmé, S.
Observations sur le traitement de la chlorose des poiriers. **(Observations on the treatment of chlorosis of pears.)**
C.R. Acad. Agric. Fr., 1958, **44**: 46-50, bibl. 10.

Chlorosis in trees growing in calcareous soils can be ameliorated by trunk injections of iron tartrate at the end of the winter, or by foliage sprays of chelates, particularly FeEDTA, without serious phytotoxic effect. [See also *H.A.*, 27: 3243.]

2310. Ford, E. M.
The control of magnesium deficiency in apple rootstock stoolbeds: progress report.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 106-12, bibl. 11.

Leaf symptoms suggestive of Mg deficiency in stoolbeds of the rootstocks M.IV and MM.102 were prevented in 3 and 4 successive years respectively by 9 spray applications annually of 2% $MgSO_4.7H_2O$ made at fortnightly intervals. Three spray applications gave partial control. The 9-spray treatment raised leaf Mg each year, but the 3 sprays only produced this effect in the fourth year. Leaf K was reduced by both treatments after 2 or 3 years. The control of leaf symptoms was only reflected in improved growth after the treatments had been in progress for 1 or 2 years. Soil applications of Epsom salts were less effective in controlling leaf symptoms of Mg deficiency than were spray applications and only increased leaf Mg slightly. This may have been due to a high soil content of available K.

2311. Beattie, J. M.
Deficiencies of potassium and manganese reduce grape yields.
Ohio Fm Home Res., 1955, **40**: 101-2, illus. [received 1958].

Visual symptoms of deficiency showed when Mn and K contents of leaf petioles in July were less than 30 p.p.m. and 1·50% of dry weight respectively. Application of 2 lb. potassium sulphate plus 1 lb. manganese sulphate per vine increased yields by 5 lb. per vine. Two consecutive annual applications should be made, the fertilizer being applied to the soil in a band 2–3 ft. wide along the rows either in autumn or early spring.

2312. Delmas, J., and Bats, J.
La carence en potasse des vergers. **(Potassium deficiency in orchards.)**
Ann. agron., 1957, **8**: 724.

Apple trees growing in soil containing less than 0·003% of K_2O were visibly deficient in K, particularly where N was abundant. Contents of N, P, K, Mg, Fe and Mn are given for apple leaves from deficient and healthy trees in 2 localities, in one of which the soil contained only 0·0024% of available K_2O, and apparently healthy trees had leaves of low K status.

2313. Bats, J., and Dartigues, A.
Utilisation des vases de la Garonne pour l'irrigation et l'amendement des vergers en bordure. **(Utilization of silt from the Garonne for irrigation and amendment of orchards on its banks.)**
Ann. agron., 1957, **8**: 740-1.

The Na content of the silt was well below the toxicity level for fruit trees. The pH was 7·6 and the K content sufficiently high to be of value in the K-deficient soils.

2314. Brough, C. R.
Work with Gravenstein gnarl!
Fruit World, Melbourne, 1958, **59**(1): 21.

Some preliminary results are given from studies on Gravenstein gnarl started in 1953. Trees grafted on Northern Spy and Malling stocks showed a much higher percentage of gnarl when scions had originated from affected trees than when healthy scions had been used. Variations in vigour in Malling stocks made little difference to the percentage gnarl, but symptom severity was increased on dwarfing stocks.

2315. Hirano, S.
Studies on peach sick soil. (IV.) Effect of dilution of sick soil and of peach leaf extract on the growth of peach seedling. (1.) [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 261-6, bibl. 11, illus.

Peach seedlings were grown in old peach soil diluted to varying extents with virgin soil. Growth improved with increasing proportions of virgin soil, reaching a maximum at 1 part of peach soil to 999 parts virgin soil, after which growth was gradually reduced. After application of water extract of peach leaves, maximum seedling growth occurred with 100 times diluted extract, and minimum growth with undiluted extract. Similar growth effects were observed with application of ether extract of peach leaves.

2316. Kirkpatrick, J. D., Parker, K. G., and Fisher, E. G.
Decline of Stanley plum accentuated by winter injury.
Plant Dis. Reptr, 1958, **42**: 65-70, bibl. 4, illus.

About 28% of the trees in a plot of 5-year-old Stanley plums on myrobalan wilted and collapsed or showed stages of collapse during the 1957 growing season. A distinctive leaf pattern and a marked overgrowth at the bud union were associated with collapse. It is suggested that collapse results from differential winter injury to cambium and xylem tissues in the bud-union area, the effect being induced or aggravated by an unknown factor.—Cornell Univ., Ithaca, N.Y.

2317. Proebsting, E. L., Jr., and Fogle, H. W.
Prune leaf curl and gum spot as influenced by crop load.
Proc. Wash. St. hort. Ass., 1957, pp. 83-6, bibl. 2.

Leaf curl, leaf spot, partial defoliation and fruit gumming on Richards Early Italian prunes were observed to be associated with shallow soil and with light crops. The symptoms were artificially produced by removing the blossoms and, as they were also associated with lowered moisture content of foliage, it is suggested that the disorder is a problem of internal water relations.—Irrigation Exp. Stat., Prosser, Wash.

Climatic factors.

(*See also* 2063, 2081, 2265, 2304, 2448e, k, u, 2449h, o.)

2318. Kretchman, D. W., and Mitchell, A. E.
The interrelationship of temperature and pesticide chemicals as affecting the finish of Golden Delicious apples.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 620-7, bibl. 11, illus.

The interaction between frost injury and spray application of captan or glyodin has been studied as it affects fruit russeting. Glyodin induced 27·8% russeting in a frost-protected tree, when no russeting resulted from captan sprays. In trees subjected to freezing temperatures 3 days after full bloom, 84·5% of the fruit treated with glyodin was heavily russeted, and 24·4% russeting was observed on captan-treated trees.

2319. Bouchet, M.
Aperçu sur les recherches poursuivies en France à l'Institut National de la Recherche Agronomique (I.N.R.A.) dans le domaine des gelées de printemps. **(A note on current research in France at the I.N.R.A. on spring frosts.)**
Fruit belge, 1958, **26**: 57-61, 73-80.

This review deals with the assessment of risk of frost damage, the various means of control, microclimatic studies in relation to frost and the effects of soil condition and vegetative cover.

2320. Peyer, E.
Erfahrungen und Untersuchungen mit der Frostschutzberegnung in der Ostschweiz im Jahre 1957. **(Results with frost protection by sprinkler irrigation in eastern Switzerland in 1957.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 83-90.

Some observations on the effect of sprinkler irrigation in frost protection are included. Protection of long vine shoots with a good leaf area was more successful than that of shoots with little leaf surface. As the days of sprinkling increased and the soil became wetter, protection seemed to become more difficult. There was no unfavourable effect of sprinkling during flowering on fruit set. Good results in one plot were obtained even when sprinkling was not started until the temperature was −1½° C.

2321. Schnelle, F., and Schneider, M.
Teilweise Frostschäden trotz Frostschutzberegnung. Erfahrungen aus dem Frühjahr 1957. **(Some frost injuries [to vine] in spite of sprinkler protection. Observations in the spring of 1957.)** [English, French and Spanish summaries about 7 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 302-10, bibl. 1, illus.

A study of the reasons for a breakdown of frost protection provided by sprinkler irrigation led to the following conclusions: Ring-like injury in vineyards occurs when the sprinkler is not working uniformly at all distances. Injury also occurs when the water, though uniform in quantity, falls in bigger drops, which happens frequently at a distance from the sprinkler. Thirdly, a section of the vineyard may be missed when the equipment is moved.

2322. Woudenberg, J. P. M.
Nachtvorstbestrijding bij lage gewassen door bedekking. **(Control of night frost in low crops by coverings.)** [English summary 12 lines.]
Meded. Dir. Tuinb., 1958, **21**: 198-202, bibl. 2.

Plots of strawberries were protected from light frost by covering them with straw, sisal kraft paper, jute or plastic. Kraft paper, jute and plastic coverings afforded the best protection; on calm, bright nights the temperature under these materials may be 3 or 4° C. higher than on exposed plots.

2323. Karnatz, H.
Untersuchungen über das Verhalten junger Apfelbäume gegenüber tiefen Temperaturen. **(Studies on the response of young apple trees to low temperatures.)**
Mitt. ObstVersuchsringes Jork, 1958, **13**: 54-60, bibl. 8, illus.

A mobile freezing chamber was used to expose two-year-old apple trees (3 years after budding) *in situ* to mean temperatures of −23°, −28° and −31° C. for 2–3 days between the end of December 1955 and the beginning of March 1956. The varieties involved in the test included Cox's Orange and 7 stem-builders, all trees being worked on Graham's Seedling. Damage to the rootstock was prevented by covering the soil with insulating material. The tabulated data show that the critical temperature—at which losses reached or exceeded 50%—lay for Cox's Orange at −23° C., for Antonovka and Jakob Fischer at about −31° C., for Pomme d'Or between −28° and −31° C. and for the rest still lower. In another experiment it was found that top-working Cox's Orange on any of the stem-builders reduced the hardiness of the stem as compared with the unworked trees, though stems under Cox were still hardier than Cox stems. In the winter of 1956/57 Cox's Orange on Graham's Seedling was much more resistant than in the preceding season, a frost of −24° C. causing only a slight reduction in growth. Possible causes are discussed of the variation in frost resistance between individual trees of the same variety—even on clonal rootstocks—and of the variation in response to low temperatures in different seasons.

2324. Kondo, I. N.
Dry-arm and spotted necrosis of vine. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18**(2): 22-5, bibl. 10.

Work in Central Asia has shown that the disease complex is due to frost injury and is aggravated by soil fungi in the covering mounds. For control the vines should be sprayed with ferrous sulphate and then carefully covered for the winter. [See also *H.A.*, 25: 1435 and 27: 2296.]

2325. Hogg, W. H., and Shepherd, F. W.
Protective cropping and shelter problems.
[*Mimeo. Publ.*] *Meteorol. Off., Lond., and Minist. Agric., Lond.*, 1957, pp. 12.

This report on a visit to Holland and Germany by the Senior Meteorological Officer, Bristol, and the Director of Rosewarne Experimental Horticulture Station has the following terms of reference: "To report on investigations and the techniques employed in respect of protective cropping and shelter problems in general, including wind tunnel work as well as field work, and in the light of this work to make recommendations for the development or modification of similar work in this country."

2326. Barlow, H. W. B., and Hancock, C. R.
The effect of a summer gale on leaves of the apple rootstock Crab C.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 96-100, bibl. 3.

Measurements of leaf growth were made on stoolbed shoots of Crab C throughout the growing season from May 27 to Oct. 9, 1956. On July 29 a severe gale caused scorching and laceration of many leaves, as did a hail storm 8 days later. Apart from this mechanical damage, leaves developing during this period were found when mature to be below average in size, to have a leathery appearance and texture and often to be slightly convex. These effects were found to be due mainly to the abrupt fall in temperature associated with the gale, although some other factor, at present unknown, also had a significant effect.

2327. Dalbro, K.
Iagttagelser og forsøg vedr. skrubben frugt og bladpletter hos Cox's Orange. **(Observations and experiments on fruit russeting and leaf spot of Cox's Orange.)** [English summary ¾ p.]
Tidsskr. Planteavl, 1958, **62**: 112-47, bibl. 8, illus.

A positive correlation was found between the number of rainy days and the amount of russeting. When the trees were covered with plastic tents from two weeks after blossoming to fruit picking, the apples remained quite smooth. Soil potash content and abundance of leaves were both negatively correlated with the amount of russeting. Cox's Orange on M.IV and M.IX were more russeted than on M.XIII and M.XVI. Significant positive correlations were found in private fruit plantations between the soil potash content and the amount of Cox's Orange spot. When the soil potash content is high the occurrence of Cox's Orange spot can be reduced by the application of suitable amounts of nitrogen. It is suggested that the spots are produced when the leaf potash content varies from too high during a dry period to low after rain. It is recommended that the soil be sampled to at least 50 cm. and preferably to 100 cm. depth when testing for potash content in fruit plantations. [From author's summary.]—Blangstedgaard.

2328. Jacoboni, N.
La produttività delle viti grandinate. **(Productivity of hail-damaged vines.)** [English summary ½ p.]
Ann. Sper. agrar., 1958, **12**: 235-70, bibl. 30, illus.

In the vine varieties Sangiovese and Verdone the depressing effects of hail on yield lasted in some instances for 3 years, but shoots developed after the first early summer pruning showed higher than average fertility.

Viruses.

(*See also* 2255, 2448q, x, 2449e.)

2329. Christoff, A.
Die Obstvirosen in Bulgarien. **(Fruit tree virus diseases in Bulgaria.)** [English summary ½ p.]
Phytopath. Z., 1958, **31**: 381-436, bibl. 57, illus.

The author reviews his work on viruses occurring in Bulgaria, covering 27 years. The viruses discussed are plum pox, plum narrow striped variegation, prune dwarf, cherry ringspot, purple peach mosaic, peach line pattern, white myrobalan mosaic, apple line mosaic, apple mosaic, pear mosaic, and pear ring pattern. Each virus is discussed under the headings: causal agent, hosts, symptoms, economic importance, varietal susceptibility, transmission, period of incubation, heat and chemical therapy, effects of rootstock, light and moisture, and relation to other viruses.

2330. Posnette, A. F., and Millikan, D. F.
Some virus-like disorders of pome fruit trees in Missouri.
Plant Dis. Reptr, 1958, **42**: 200-1, bibl. 7, illus.

Five previously unreported disorders on pome fruits are recorded. These disorders and the virus disease they resemble are chat fruit, rough skin and rubbery wood on apple and vein yellows and red mottle on pears. The occurrence of these disorders in commercial orchards suggests that the need for precautions in propagation is no less for pome than for *Prunus* fruit trees, for which scion certification programs are already in operation. [Authors' abstract.]—E. Malling Res. Stat., Kent, and Mo agric. Exp. Stat., Columbia.

2331. Hunter, J. A., Chamberlain, E. E., and Atkinson, J. D.
Note on transmission of apple mosaic by natural root grafting.
N.Z. J. agric. Res.,* 1958, **1**: 80-2, bibl. 17, illus.

Natural transmission of apple mosaic has been observed in closely planted seedlings. On excavation it was found that the naturally-infected trees were connected to adjacent diseased trees by root grafts.

2332. Gilmer, R. M., Brase, K. D., and Parker, K. G.
Control of virus diseases of stone fruit nursery trees in New York.
Bull. N.Y. St. agric. Exp. Stat. **779**, 1957, pp. 53, bibl. 26, illus.

Symptoms of the chief virus diseases of stone fruits in New York are described. Several methods of indexing are necessary for their identification [see also *H.A.*, 27: 346j]. The certification programme in New York is discussed.

2333. Jordović, M.
Ispotivanje šarke na šljivi. Dejstvo *Prunus virus* 7 (Hristov) na lišće nekih sorata šljiva. **(A study on plum pox. The effect of *Prunus virus* 7 on the leaves of some plum varieties.)** [English summary 1½ pp.]
Zasht. Bilja, 1957, No. 39-40, pp. 13-22, bibl. 5, illus.

A 3-year study was conducted on the reaction of 28 plum varieties to plum pox. The varieties were infected by budwood or inoculum from the highly susceptible variety Požegaća. It was found that: there were varietal differences in the symptoms with respect to the number, shape, colour and intensity of spots; the effects were most serious on the varieties Crvena Ranka and Imperial Epineuse and mild on Metlaš and Magna Glauca; and no variety was resistant or a symptomless carrier.

2334. Bos, L.
Heksenbezemverschijnselen, een pathologisch-morfologisch onderzoek. **(Witches' broom phenomena, a patho-morphological study.)** [English summary 5½ pp.]
Meded. LandbHogesch. Wageningen, 1957, **57**(1): 1-79, bibl. 262, illus.

Witches' broom symptoms are associated with virus infections in certain tropical legumes, in the raspberry and possibly in *Tropaeolum*. A number of other similar plant diseases appear to be related. The morphological changes which characterize witches' brooms are described. They show abnormal vegetative growth at the expense of reproductive growth, the withdrawal of apical dominance, increased negative geotropy and disturbance of periodicity. Since some of these phenomena are normally controlled by auxins, it is probable that the effect of the witches' broom virus infection is to disturb the activity of plant hormones.

2335. Bringhurst, R. S., and Voth, V.
Strawberry virus transmission by grafting excised leaves.
Plant Dis. Reptr, 1956, **40**: 596-600, bibl. 2, illus. [omitted in error from *H.A.*, Vol. 26].
Cropley, R.
Erratic transmission of strawberry viruses by grafting excised leaves.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 124-5, bibl. 7.

The transmission technique described in the first paper involves replacing a terminal leaflet of the indicator plant, *Fragaria vesca*, by a terminal leaflet of the plant to be tested. A wedge graft of the scion leaflet is inserted into a slit made between two lateral leaflets on the stock plant and the graft is wrapped as tightly as possible; at least two-thirds of the scion leaflet is cut off to reduce transpiration. Leaves can be collected from the field and either grafted immediately or stored for a month or more in polythene at 36° F. before being grafted. In tests at the University of California, Davis, strawberry viruses were readily transmitted by this method, symptoms developing within 2 to 5 weeks.

In trials at East Malling, however, the method gave erratic results in transmitting virus diseases.

2336. Moulton, J. E., and others.
Comparison of virus-free stocks of strawberries with standard commercial plants.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 568-74, bibl. 9, illus.

Virus-free plants of Catskill and Premier were significantly more vigorous than commercial stocks (containing yellows type virus). No differences in yields were obtained from 2-year-old commercial stocks of

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* Formerly *N.Z.J. Tech., Sect. A.*

Robinson and Catskill, but commercial stocks of Premier were slightly more productive than were healthy plants.

2337. Rogers, W. S., and Fromow, M. G.
Field performance of heat-treated strawberry clones.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 50-6, bibl. 4.

Strawberry clones freed from certain viruses by heat therapy grew more vigorously than comparable untreated clones—the increased vigour varying both according to the varietal tolerance of viruses, and the initial virus content of the clone. Yield was markedly increased in several varieties, including Cambridge Favourite and Huxley, but decreased in Early Cambridge and Rearguard. This decrease was due to reduced blossom formation apparently connected with excessive vigour. Blossom initiation was found to be later in the heat-treated than in the untreated clones of these two varieties. Fruit of the treated clones was rather later ripening and showed a greater tendency to *Botrytis* rot than that on the untreated clones. The treated clones succumbed more slowly than untreated ones to virus reinfection in the field. Where reinfection was fairly rapid, as it might be in commercial areas, the treated clones showed to greatest advantage. [Authors' summary.]

2338. Collins, W. B., and Morgan, G. T.
Green petal of strawberry in New Brunswick.
Plant Dis. Reptr, 1958, **42**: 339-41, bibl. 7.

Senator Dunlap, Sparkle and Catskill are all susceptible to green petal. Chemical control of the vector within the plantation was not obtained with malathion sprays applied between planting and fruiting. —Exp. Fms Serv., and Sci. Serv., Fredericton, New Brunswick.

2339. Goheen, A. C., Harmon, F. N., and Weinberger, J. H.
Leafroll (white Emperor disease) of grapes in California.
Phytopathology, 1958, **48**: 51-4, bibl. 14, illus.

Fruit and foliage symptoms of grape leafroll indicate that it is identical with the virus disease known for several years in California as white Emperor disease. Fruits on affected vines generally have less sugar at harvest time than those on healthy vines of the same variety. The color of fruits on affected vines of varieties that normally produce red berries remains greenish white. Leaves on affected vines generally roll downward and chlorotic areas develop along the margins and between the principal veins by midsummer. The chlorotic areas turn red on leaves of varieties that produce red or black fruit. On leaves of many varieties the chlorotic areas may become necrotic so that the foliage in the fall appears burned. Foliage symptoms appear first on the oldest leaves near the base of the canes. Symptoms of leafroll are similar to those of brunissure, rougeau, flavescence, and potassium deficiency. The use of virus-infected stocks or buds in propagating new vines appears to be the principal method by which the disease is spread in California. [Authors' summary.]—Univ. Calif., Davis, and hort. Field Stat., Fresno, Calif.

2340. Ochs, G.
Über drei Viren als Erreger von Rebkrankheiten. (**On three viruses causing diseases of the vine.**) [English summary 9 lines.]
Z. PflKrankh., 1958, **65**: 11-17, bibl. 4, illus.

It is shown that the disease of vines described in Germany as "Reisigkrankheit" or infectious degeneration is caused by a virus complex. The following are the symptoms associated with virus 1, 2 and 3 respectively: 1, mosaic-like discoloration of the leaf; 2, combined with 1 or 3, yellow mosaic; 3, stunted growth and deformations of the leaf. Host plants, transmission, physical properties and other characteristics of the viruses are discussed. [For a method of testing the viruses, see *H.A.*, 28: 250.]—Inst. Weinbau, Bernkastel-Kues, and Inst. landw. Virusforsch., Brunswick.

2341. López Cristóbal, U.
Aceria ficus (Cotte) ácaro vector del mosaico de la higuera nuevo para la Argentina. (***Aceria ficus* a mite vector of fig mosaic new to Argentina.**)
Idia, 1957, No. 116, pp. 20-1, bibl. 10, illus.

The pest is controlled by a combination of winter pruning and calcium polysulphide spraying at 10° Baumé, followed by treatment at bud burst with the same substance at 4° B., and 3 spring treatments at 3-week intervals with [organic] phosphoric insecticides.

Bacteria.

(*See also* 2448h.)

2342. Kienholz, J. R.
Role of streptomycin sprays in the control of fire blight on pears.
Proc. Wash. St. hort. Ass., 1957, pp. 39-40.
Fire blight control.
Bett. Fruit, 1958, **52**(6): 6, 24-5.

Agri-mycin "100" at 60 p.p.m. gave considerable protection to Forelle pears and reduced the extent of hand cutting. Four or five sprays at 7-day intervals are recommended. Copper oxychloride at 1 lb./100 gal. was equally effective but somewhat phytotoxic. —U.S.D.A., Hood River, Oregon.

2343. Sprague, R.
Further studies on the time of year to remove blighted limbs.
Proc. Wash. St. hort. Ass., 1957, p. 41.

Cutting out infected shoots in June resulted in 10 to 20% reinfestation of pears by *Erwinia amylovora*. Cutting in late July and spraying with 50 p.p.m. streptomycin nitrate on same day as pruning gave almost complete control.—Tree Fruit Exp. Stat., Wenatchee, Wash.

2344. Deep, I. W.
Reduction in incidence of crown gall of mazzard cherry following antibiotic treatments.
Plant Dis. Reptr, 1958, **42**: 476-80, bibl. 6.

Mazzard cherry seedlings were given preplanting treatments of streptomycin sulphate, Agrimycin and Terramycin at 100, 200 and 400 p.p.m. for periods of 1 minute to 3 hours. Crown gall infection was significantly reduced by all antibiotics, but Terramycin was the most effective. Terramycin at 400 p.p.m. for

15 min., or 200 p.p.m. for 1 hour, was significantly more effective than a standard Semesan Bel treatment. Chemotherapeutic activity was indicated since the incidence of infection in the uninoculated control was significantly higher than in trees treated with 400 p.p.m. of Agrimycin for 1 hour.—Oregon agric. Exp. Stat., Corvallis.

2345. Klos, E. J.
Bacterial spot of peach and its control.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 653-8, bibl. 1, illus.

Autumn applications of copper sprays did not control bacterial spot [*Xanthomonas pruni*]. Summer sprays of Niacide Z-65 gave fair control, comparable to zinc sulphate plus lime. Streptomycin (100 p.p.m.) gave good control against leaf infection. The time of application for both of these sprays needs further study.

2346. Dye, M. H.
Development of streptomycin-resistant variants of *Pseudomonas syringae* van Hall in culture and in peach seedlings.
N.Z. J. agric. Res.,* 1958, **1**: 44-50, bibl. 8.

Streptomycin applied as a spray at concentrations of 100 and 500 μg./ml., did not reduce infection in peach seedlings inoculated with a strain of *Pseudomonas syringae* resistant to 340 μg./ml. streptomycin. In the same experiment a combination of streptomycin and oxytetracycline significantly reduced infection at both 100 and 500 μg./ml. total antibiotic. [From author's summary. [For earlier work see *H.A.*, 28: 1301.]—D.S.I.R., Auckland.

2347. Wilson, D. W.
Stone-fruit blast experiment.
Orchard. N.Z., 1958, **31**(1): 32.

Bordeaux sprays were applied to apricot trees between mid-April and mid-September for 6 successive seasons. The sprays were partially effective in preventing blast (*Pseudomonas syringae*) infection, particularly when applied at intervals during the late autumn and early winter.

2348. Goss, O. M.
Bacterial canker of stone fruits.
J. Agric. W. Aust., 1958, 7(1): 73-8, illus.

Tentative recommendations for the control of *Pseudomonas syringae* on plums include spraying ¾ oz. streptomycin sulphate, plus ½ gal. glycerine in 50 gal. water, twice or thrice during leaf-fall at weekly intervals.

2349. Freeman, H.
Bacterial blight of walnuts.
J. Agric. Vict., 1958, **56**: 247-9, bibl. 1, illus.

Bordeaux mixture, 5 : 2 : 1¼ (white spraying oil) : 100, sprayed thrice, viz.: when terminal buds opened, just before pistillate flowers came into full bloom and when young nuts were 3/16 in. in diameter, gave effective control of *Xanthomonas juglandis*.

2350. Miller, P. W.
Recent studies on the effectiveness of Agri-mycin 100 and Agri-mycin 500 for the control of walnut blight in Oregon.
Plant Dis. Reptr, 1958, **42**: 388-9, bibl. 8.

Agri-mycin 500 at ½ lb. in 100 gal. water gave relatively good control of *Xanthomonas juglandis*. Four applications reduced the incidence of infected nuts from 39% to 3%. No injury to the units or leaves was observed. —Agric. Res. Serv., U.S.D.A., and Ore. agric. Exp. Stat.

Fungi.

(*See also* 2448c, f, g, s, 2449j-l, q, t.)

2351. Darpoux, H., and Arnoux, M.
Essais de produits à action curative contre les tavelures du poirier et du pommier
(Trials of compounds for curative* control of apple and pear scab.)
Reprinted from Phytiatrie-Phytopharmacie, 1957, **6**:9-13, bibl. 3.

Copper oxyquinolinate has given curative control of pear scab. Promising results were obtained with actidione trichothecin, dichlone and oxyquinoline sulphate for controlling apple scab.—Stat. centr. Path. veg. I.N.R.A., Versailles.

2352. Darpoux, H., and Arnoux, M.
Étude de l'efficacité de divers produits contre les tavelures du poirier et du pommier.
(Study of the efficiency of various compounds against apple and pear scab.)
Reprinted from *Phytiatrie-Phytopharmacie*, 1957, **6**: 3-7, bibl. 6.

Preventive control of pear scab was obtained with dichlone, thiocyanodinitrobenzene and copper oxyquinolinate. Sprays of dichlone, thiocyanodinitrobenzene, a mixture of thiram, ziram and dimethyldithiocarbamate dimethylarsine, glyodin, and copper oxyquinolinate gave effective preventive control of apple scab. Copper oxyquinolinate also showed some curative effect.—Stat. centr. Path. vég., I.N.R.A., Versailles.

2353. Cation, D.
Comparison of fungicides for control of apple scab at Paw Paw.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 603-8.

A new fungicide, Cyprex (n-dodecylguanidine acetate), was markedly superior to the other fungicides tested for scab control. Cyprex induced severe russeting on 1% of McIntosh fruits.

2354. Dobie, N. D.
Fungicide tests for apple scab control in Oregon.
Proc. Wash. St. hort. Ass., 1957, pp. 37-8.
New fungicides used to check apple scab.
Bett. Fruit, 1958, **52**(6): 23-4.

Cyprex at 1 lb. per 100 gal. water applied at normal spray stages more effectively controlled scab than several other fungicides tested. There was no phytotoxicity except at freezing temperatures.—Oregon St. Coll.

2355. Powell, D., and others.
The fungicidal efficacy of Cyprex against apple scab.
Plant Dis. Reptr, 1958, **42**: 493-8, bibl. 2.

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* See also 2449k

Rates of ¾, 1, and 1½ lb. Cyprex per 100 gal. were equally effective in giving 99% control of apple scab. Other fungicides tested gave from 45% to 57% control. Cyprex gave excellent and long protection of fruit from scab infection at 2 lb. per 100 gal. Foliage protection at this dosage was satisfactory for approximately 30 days. Residue analyses at harvest showed amounts varying from 0·01 p.p.m. to 0·49 p.p.m.—Univ. Illinois, Urbana.

2356. F. W. Berk and Co. Ltd.
Four years trials, 1954-1957, with Phelam, a new organo mercury fungicide, for the control of apple scab (*Venturia inaequalis* (Cooke) Wint.).
Tech. Bull. Tilgate Res. Stat. 7, 1957, pp. 5, bibl. 1.

Applications of Phelam (phenyl mercury dimethyldithiocarbamate) to Cox's Orange Pippin gave control of apple scab similar to that with lime sulphur and phenyl mercury chloride sprays. Yields were increased after Phelam treatment, which was less phytotoxic than lime-sulphur. Increased yields with good scab control were also obtained with Phelam applications to 18 apple varieties.

2357. Hirst, J. M.
Get rid of infected dead leaves.
Grower, 1958, **49**: 681-3, illus.
Separate spring campaigns are not enough.
Grower, 1958, **49**: 741-3.

The author discusses scab control in relation to results obtained from a joint investigation by the N.A.A.S. and Rothamsted Experimental Station. It is suggested that the introduction of organo-mercurial sprays have reduced spring releases of ascospores. Spraying dry leaves just before bud burst with DNOC has reduced ascospore counts by 95%. [For earlier work see *H.A.*, 27: 3272.] Observations on the suitability of the Mills' table for English conditions are inconclusive.

2358. Conners, I. L.
Losses caused by apple scab in Nova Scotia.
Plant Dis. Reptr, 1958, **42**: 165-8, bibl. 3.

From published estimates of the percentage of scabby fruit found in apple orchards in Nova Scotia and of the volume and value of the crop, it was estimated that in recent years loss from scab amounted to $137,000 a year. To protect their crop, valued at $1,685,000, from the worst ravages of the disease the growers in the same period spent $442,000 a year in spray materials and their application. [Author's abstract.]—Sci. Serv., Canad. Dep. Agric., Ottawa.

2359. Petronijević, M.
Suzbijanje čadave krastavosti na jabuci sa osvrtom na rentabilnost ove mere. (**Apple scab control with reference to the economic value of the treatment.**) [French summary 7 lines.]
Zasht. Bilja, 1957, No. 39-40, pp. 61-72.

The yield, quality and monetary value of sprayed and unsprayed crops are compared. The study conducted on 8 varieties using bordeaux, zineb and Venturicid confirmed the desirability of scab control. The organic fungicides were as effective and somewhat cheaper than bordeaux.

2360. Sprague, R.
Apple powdery mildew spray trials at Wenatchee, Washington, in 1957.
Plant Dis. Reptr, 1958, **42**: 100-1.

Several fungicides were applied at intervals of 12 to 14 days, in up to 6 applications, for control of *Podosphaera leucotricha*. Promising results were obtained with Geigy G28810, Phybam (on sulphur-tolerant trees), American Cyanamid Exp. F. 5223, Carbide Carbon Res. F10521 and Carbide Carbon Res. F9688.—Tree Fruit Exp. Stat., Wenatchee, Wash.

2361. Groves, A. B., Wampler, E. L., and Lyon, C. B.
The development of an efficient schedule for the use of karathane in the control of apple powdery mildew.
Plant Dis. Reptr, 1958, **42**: 252-61.

Three experiments carried out in Virginia and California showed that the time interval between sprays was a more important factor, by a ratio of 4 : 1, than the rate of usage in determining the effectiveness of karathane for control of *Podosphaera leucotricha* on apples. Application of small amounts at frequent intervals proved most efficient, a rate of 8 oz./100 gal. at intervals of 2 weeks or less being recommended for the cover spray programme. More frequent applications and lower rates may be required early in the season or under severe disease conditions.—Va agric. Exp. Stat., and Res. Div., Rohm and Haas Co.

2362. Hey, G. L., and Hunnam, D.
Results of spray trial for apple mildew.
Grower, 1958, **49**: 1336.

Several spray materials were tested for control of apple mildew, and the best control was obtained with a captan/karathane mixture (2 lb./1 lb. per 100 gal.). A mixture of captan/sulphur (2 lb./2½ lb. per 100 gal.) was not sufficient to control heavy mildew infection. The ability of the mercury fungicide to check infection is attributed to its content of 8-hydroxyquinoline.—Murphy Chem. Co.

2363. Braun, H., and Kröber, H.
Untersuchungen über die durch *Phytophthora cactorum* (Leb. u. Cohn) Schroet. hervorgerufene Kragenfäule des Apfels. (**Studies on collar rot of apple caused by *Phytophthora cactorum*.**)
Phytopath. Z., 1958, **32**: 35-94, bibl. 74, illus.

In recent years collar rot has begun to cause considerable losses in Western Germany where apples are grown intensively. *In vitro* studies of *Phytophthora cactorum* included fungicidal test in which a mercurial compound proved very effective at a low concentration. The pathogenicity of strains of the fungus was found to vary with their origin. Cox's Orange and some other commercially important varieties were shown to be susceptible to the disease. Of EM rootstocks, IV and IX proved resistant, the rest being susceptible. Two-year-old trees of two cherry varieties were more easily infected with mycelium than the most susceptible apple varieties. While in the laboratory younger trees proved hardly more resistant than older trees, incidence in the field was largely confined to the latter category. This is due to the cracking of the bark at the base of the stem increasing with age. The fungus spreads fastest in the parenchyma of the bark, the optimum temperature for the growth of the mycelium in the field—as opposed to the laboratory—being 16–21° C. Since *P. cactorum* dies off in dead bark tissue without forming frictifications to any extent, dropped or low-hanging fruits must be considered as the main hosts where multiplication of the fungus occurs. The soil acts as a reservoir of the spores which are splashed onto the stem in heavy rain. Outbreaks of collar rot should be guarded against by the destruction of infected windfalls and by the continuous chemical protection of the stems of susceptible varieties of susceptible age up to a height of 75 cm. when the temperature of the soil surface is 17–18° C. or above. In the case of new plantings resistant rootstocks should be high worked or resistant interstocks should be used. Provided the disease is recognized early, affected trees may be cured by burning the fungus around the rotted zone of the bark or by surgery.—Inst. Pflanzenkrankh., Univ. Bonn.

2364. Roosje, G. S., and ten Houten, J. G.
Phytophthora cactorum (Leb. and Cohn) Schroet. en *P. syringae* Klebahn bij appel en peer. **(*Phytophthora cactorum* and *P. syringae* in apple and pear.)**
Tijdschr. PlZiekt., 1958, **64**: 120.

Recommendations for the control of collar rot are given. Infected bark should be cut out to a depth of [illegible] cm. into healthy wood. A paste of 4 kg. copper oxychloride and 4 kg. wheat flour in 100 l. water may be applied to the trunks several times a year to prevent infection. In new Cox plantations a resistant interstock (Dubbele Zoete Aagt or Dubbele Bellefleur) may be used.

2365. Hunnam, D., Bagnall, B. H., and Bennett, M. F.
Knapsack spraying with captan in laden orchards.
Grower, 1958, **49**: 800-1, illus.

Programmes of captan sprays (high and low volume) and dusts were applied by knapsack sprayers to mature apple trees in late summer. All treatments significantly reduced gloeosporium infection, with a tendency for better control with sprays than with dusts. Dipping the fruit in a captan suspension before storage gave inconclusive results.—Murphy Chem. Co., Wheathampstead, Herts.

2366. Hunnam, D., Bagnall, B. H., and Bennett, M. F.
Gloeosporium—surprise in pruning trial.
Grower, 1958, **49**: 1069-71.

Some reduction in gloeosporium cankers was obtained by a severe pruning schedule, but the beneficial effect is likely to be long-term. Fruit infections showed a significant increase after severe pruning.—Murphy Chem. Co., Wheathampsead, Herts.

2367. Stojanović, D., and Kostić, B.
Kretanje intenziteta napada *Monilia fructigena* (Aderh. et Ruhl.) Honey i *Monilia laxa* (Ehrenb.) Sacc. na šljivama i jabukama i njihov medusobni odnos u prirodi. **(Fluctuations in the intensity of attack by *Monilia fructigena* and *M. laxa* on plum and apple trees and their relationship in nature.)** [English summary 1 p.]
Zasht. Bilja, 1957, No. 39-40, pp. 81-7, bibl. 10.

The results of inspections of a large number of plum and apple orchards during 1955 are tabulated and graphed. In the majority of the orchards infection by *Monilia fructigena* was greater than that by *M. laxa*. *M. laxa* predominated earlier in the season and *M. fructigena* later.

2368. de Meirleire, H.
La moniliose de l'abricotier dans la région de Rabat. **(Brown rot of apricot in the Rabat area.)**
Terre maroc., 1958, **32**: 96-7.

Comparative tests with bordeaux mixture and synthetic fungicides, separately or in combination, have not revealed any satisfactory curative treatment for apricots attacked by *Sclerotinia laxa* (syn. *Monilia laxa*). For young orchards stringent preventive measures are necessary and in older stands the severely affected trees should be replaced and all diseased material cut out and burned.

2369. Tindale, G. B., Jenkins, P. T., and Peggie, I. D.
Brown rot in canning peaches.
J. Agric. Vict., 1958, **56**: 107-11, illus., and *Fruit World, Melbourne*, 1958, **59**(3): 15-17.

As *Sclerotinia fructicola* does not develop at temperatures above 94° F., peaches harvested up to 7 days earlier than normal can be safely stored at 94°–95° F. when they will ripen satisfactorily. At this temperature, however, low R.H. causes shrivelling and high R.H. causes the development of other rots. Further investigations are being made into the optimum conditions of storage.

2370. McArdle, F. J., Nicholas, R. C., and Wiant, D. E.
Rays show big promise in curbing fruit decay.
Food Engng, 1957, **29**(4): 74, 76, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,451.

Laboratory tests have indicated that brown rot in peaches can be controlled by uniform irradiation of the surface of the fruits with cathode rays. A dosage of 150,000 rep was more effective than 75,000, 100,000 or 125,000 rep; during subsequent storage at room temperature for 10 days the rotting was reduced by 95%, compared with that which occurred in a similar sample of unirradiated fruits, and there were no detectable changes in flavour, colour or appearance. The equipment is described, including a specially designed roller conveyor which turns the fruit as it passes through the electron beam.

2371. Manzo, P.
Risparmio di rame nella lotta contro il *Coryneum* e la *Taphrina* del pesco. **(Economising copper in the control of *Coryneum* and *Taphrina* on peach.)** [English, French and German summaries 7–10 lines each.]
Frutticoltura, 1958, **20**: 125-6, illus.

Owing to scarcity of copper, the concentration of bordeaux sprays was reduced from 3% to 1·5%, but the control of *Coryneum* and *Taphrina* on peach did not suffer. Application was modified so that some of the deposit formed by the liquid remained in the angle where each bud was inserted on the twig. This required high pressure and close range spraying, with special attention to apical regions for protection against leaf curl.

2372. English, H.
Fall application of ziram and ferbam effectively control peach leaf curl in California.
Plant Dis. Reptr, 1958, **42**: 384-7, bibl. 8.
Peach leaf curl controlled by new fungicides.
West. Fruit Gr, 1958, **12**(3): 17-18, illus.

Late autumn applications of ziram and ferbam were highly effective in controlling peach leaf curl. Ziram was significantly better than basic copper sulphate, and ferbam and ziram appeared to be at least as effective as bordeaux mixture. Adhesive oils did not significantly increase the efficiency of ziram. No phytotoxicity was observed.
The second article is a more popular account of the same work.—Univ. Calif., Davis.

2373. Klos, E. J., and Rebmam, E.
Cherry leaf spot control and physiological effects by new and standard fungicides.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 646-52, bibl. 3.

Cyprex was outstanding in cherry leaf spot (*Coccomyces hiemalis*) control, and total solids content of sprayed fruit was similar to that of the control at harvest. Phygon and Thylate gave good results in controlling cherry leaf spot.

2374. Fulton, R. H.
Controlling mummy berry disease of blueberries by soil treatment.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 491-7, bibl. 4, illus.

Eradicant soil treatments with Aero calcium cyanamid dust gave better control of mummy berry disease than did protective foliar spray treatments. Apothecial destruction was improved by delaying the eradicant treatment until partial emergence of apothecia. The 200 lb. per acre treatment was adequate and no phytotoxicity was observed.

2375. Dement'eva, M. I.
***Phyllosticta* on gooseberry.** [Russian.]
Sad i Ogorod, 1958, No. 1, p. 72, illus.

Phyllostica grossulariae on the berry and *Septoria ribis* on the leaf are apparently forms of *Mycosphaerella ribis* and can be controlled, in the autumn after leaf fall or in spring before bud burst, by spraying the soil around the bushes with 6% ferrous sulphate. In the summer 1% bordeaux should be applied every 10–12 days.

2376. Moore, M. H.
The incidence and control of cane spot *Elsinoë veneta* (Burkh.) Jenk.) on loganberry.
J. hort. Sci., 1958, **33**: 96-107, bibl. 12.

A sequence of pre- and post-blossom sprays of Cu materials gave satisfactory protection against cane spot. The method of cane-training had a marked effect on the efficacy of the spray treatment. More sprays were needed when the young canes were tied in below fruiting canes (method II) than when they were arranged above them during the growing period (method I). With method I canes were more susceptible to spray damage in the following year, but the adverse effect of the spray on yield was reduced by using lower Cu concentrations in the post-blossom spray. Crop yields from canes trained by method II were lower than from those trained by method I. —E. Malling Res. Stat., Kent.

2377. McKeen, W. E.
Red stele root disease of the loganberry and strawberry caused by *Phytophthora fragariae.*
Phytopathology, 1958, **48**: 129-32, bibl. 6, illus.

On Vancouver Island an unthriftiness of most loganberry plantations has resulted from necrosis of loganberry roots during autumn and winter when the soil is cool and very wet. The root decay is incited by a *Phytophthora* sp. that invariably is very closely followed by *Pythium* spp. Difficulty is experienced in isolating the primary pathogen because of its close association with *Pythium* spp., its relatively slow rate of growth, and its inability to grow at high temperatures and on certain media. This pathogen is considered to be a strain of *Phytophthora fragariae*. The relationship of the loganberry race of *P. fragariae* to the race that causes root degeneration of raspberry is unknown because the latter has not been obtained in pure culture. [From author's summary.]—Univ. west. Ont., London, Canada.

2378. Hårdh, J. E.
Mansikan harmaahomeen torjuntaa. **(Fighting the *Botrytis* mould of strawberries.)** [English summary 9 lines.]
Puutarha, 1958, **61**: 84.

In 1956 0·003% Actidione reduced the incidence of *Botrytis* rot in Bliss strawberries from 7·5% in control plants to 1·8%; Pomasol forte and Orthocide (captan) both at 0·2% were less effective (2·6 and 3·6% mouldy fruits). In the wet summer of 1957 the incidence of *Botrytis* rot on unsprayed plots of Ydun strawberries was 42·4%. Orthocide dust and Pomasol reduced the incidence to 20·8 and 21·8% respectively, but Actidione, griseofulvin and Omadine Zn gave little or no control. —Hort. Res. Inst., Piikkiö.

2379. Fulton, R. H.
Studies on strawberry leaf spot in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 581-8, bibl. 10, illus.

Leaf spot (*Mycosphaerella fragariae*) symptoms are described and observations on varietal susceptibility are given. Cyprex (n-dodecylguanidine acetate) gave excellent control of leaf spot, while tri-basic copper was only partially effective and resulted in some injury.

2380. Till, B. B.
Experimental control of strawberry mildew in Cheddar.
Plant Path., 1958, **7**: 30-1.

The incidence of mildew (*Sphaerotheca humuli*) on strawberry leaves and fruit was significantly reduced by dinitrocaprylphenyl crotonate, griseofulvin and captan sprays. The best control was obtained with 3 applications of dinitrocaprylphenyl crotonate during blossoming.—N.A.A.S., Bristol.

2381. Morschel, J. R. G.
Vine diseases on the Murrumbidgee Irrigation Areas.
Agric. Gaz. N.S.W., 1958, **69**: 36-42.

Control of black spot, *Elsinoë ampelina*, was obtained by thiram or ziram at 1½ lb. per 100 gal., applied early. Bordeaux 8 : 8 : 100, applied regularly, controlled downy mildew, *Plasmopara viticola*. Zinc bordeaux mixture improved yield where incipient zinc deficiency occurred. A tabulated programme of recommended fungicidal treatment is given.

2382. Zabala, S.
El control de la antracnosis de la vid. (Informe preliminar.) **(Control of vine anthracnose.—Preliminary report.)**
Idia, 1957, No. 117, pp. 12-17, bibl. 10, illus.

Slight protection was given by ferbam at 300 g. per 100 l. of water, but this needed a spreader. Bordeaux dust gave fairly good protection. Cuprous oxide, wettable sulphur, ferrous sulphate and powdered slaked lime were unsatisfactory. Resistant, moderately resistant and susceptible varieties in Argentina are listed.

2383. Rajkov, E., and Jonev, S.
Incubation periods of downy mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1958, **18**(1): 29-36.

An account of observations made in Bulgaria on the duration and frequency of the incubation period of vine downy mildew, with the object of timing spray application. With incubation periods of over 5 days, frequent rain or dew and vigorous shoot growth, sprays should be applied before the end of each period. With 4–5-day incubation periods spraying during one period before and one after flowering and every period during flowering should suffice.

2384. Casarini, B.
Sulla durata del periodo di incubazione della *Plasmopara viticola*. **(The length of the incubation period of downy mildew of vine.)**
Reprinted from *Atti Accad. Sci. Ist. Bologna Rendic. Ser.* 11, 1957, **4**: 205-16, bibl. 6.

When conidia were discharged in wet weather the incubation period was the same as when the vines were covered at night, but when the discharge occurred in fine weather incubation was prolonged by 1 or more days, even when R.H. at night reached 85–90%. Dew remaining on the leaves for some hours was much less serious than rain of comparable duration in promoting infection. Discharge can be forecast with considerable accuracy from two incubation curves, plotted for a range of daily average temperatures from 14 to 26° C. in wet and dry weather, and fungicidal treatments can be made accordingly.

2385. Baldacci, E., and Refatti, E.
La lotta contro le due maggiori ampelopatie: peronospora (*Plasmopara viticola*) e oidio (*Uncinula necator*) in relazione alla conoscenza dei periodi di incubazione e dei cicli biologici. I and II. **(Control of the two chief diseases of vines—downy mildew (*Plasmopara viticola*) and powdery mildew (*Uncinula necator*) in relation to knowledge of incubation periods and biological cycles. I. Application of the incubation calendar compared with primary infections of downy mildew (1950-55). II. Analysis of secondary infection incidence of downy mildew (1950-55).)** [English summary 1¼ pp.]
Reprinted from *Ann. Fac. Agrar. Milano*, 1956, **5**(N.S.): 35-57, bibl. 9, and 151-78, bibl. 27.

Data collected from various observation centres in northern Italy show that primary infection by downy mildew occurs with a combination of minimum temperature 10° C., abundant rain, presence of young vine leaves at least 6–9 sq. cm. in area and spores of good viability. The forecasting system used gave sufficient warning of all primary attacks, however slight. Secondary infection, with one season's exception, was highly correlated with rainfall dates. Variations in incubation period were connected with both temperature and R.H. It is not considered safe to end fungicidal treatment in mid July.

2386. Lafon, J., Couillaud, P., and Gay-Bellile, F.
Présentation d'une note sur la technique des brouillards légers aqueux à 30 litres de liquide par hectare. **(A note on the method of mist spraying at 30 litres of liquid per hectare.)**
C.R. Acad. Agric. Fr., 1958, **44**: 211-21, bibl. 2.

Mist sprays of copper plus zineb at 30 l./ha. have given control of brown rot and of mildew occurring during vine development equal to that of ordinary sprays, using 800 l./ha. For control of mildew developing in the autumn mist spray treatments gave better control. Sampling has shown that copper is deposited equally on both leaf surfaces by mist spray application, while more Cu was deposited on the upper surface with normal spraying.—Stat. vitic., Cognac.

2387. Staehelin, M., and Bolay, A.
Influence des fongicides organiques sur le développement de l'oïdium de la vigne. **(The effect of organic fungicides on the development of vine powdery mildew.)**
Rev. romande Agric. Vitic., 1958, **14**: 39-42.

The extent of leaf and berry infections by powdery mildew was assessed after application of sulphur, copper and organic fungicides. The results emphasize the importance of Cu in mildew control. Recommendations given are copper and/or organic fungicides for pre-blossom treatments, and bordeaux mixture for post-blossom treatments.—Stats féd. d'Essais agric., Lausanne.

2388. Biraghi, A.
Il cancro della corteccia del castagno. **(Bark canker of chestnut.)**
Inf. fitopat., 1958, **8**: 2-5, illus.

The bark-canker fungus (*Endothia parasiticc*) rarely attacks shoots less than 4 years old. If coppice shoots are cut out as soon as the disease appears on them, subsequent shoots develop a progressive resistance, the first sign of infection being prominent scarring with fissures reaching inward to the wood. Gradually the fungus is confined to the outermost tissues and finally no external irregularities are visible on the newer growth. Such recovery from an otherwise fatal fungus disease is extremely rare in woody plants.

2389. Fowler, M. E., and Berry, F. H.
Blossom-end rot of chinese chestnuts.
Plant Dis. Reptr, 1958, **42**: 91-6, illus.

Results from experiments on fungicidal control of *Glomerella cingulata* were inconclusive. Some trees showed resistance to the disease, and it is suggested that removal of diseased trees may be the best method of control.—Forest Serv., U.S.D.A., Upper Darby, Pa, and Agric. Res. Serv., U.S.D.A., Beltsville, Md.

2390. Converse, R. H.
A comparison of protectant fungicides for pecan scab control in Oklahoma in 1957.
Plant Dis. Reptr, 1958, **42**: 390-2, bibl. 13.

Seven protectant spray materials were used in a field test for the control of scab on pecan nuts. Dyrene gave excellent control of the disease. None of the 5 dithiocarbamates tested gave significantly better control than ziram, but results with maneb were the most uniform. [For earlier work see *H.A.*, 27: 1302.]—Agric. Res. Serv., U.S.D.A., and Okla agric. Exp. Stat., Stillwater.

Nematodes.

(*See also* 2161, 2449c, 2532, 2533, 2705-2707, 2785, 2858, 2879, 2924, 2945e, 3027q.)

2391. Pääsuke, M.
Jordgubbsnematoden och dess bekämpning. **(Strawberry nematode and its control.)**
Fruktodlaren, 1958, **29**: 45-8, bibl. 7, illus.

After hot water treatment survival of the strawberry variety NorthWest was about 50%, Königin Louise 50–60%, and Macherauchs Frühernte 60–70%.

2392. Lownsbery, B. F., and Sher, S. A.
Root-lesion nematode on walnut.
Calif. Agric., 1958, **12**(5): 7, 12, illus.

Young California black walnut and Paradox hybrid seedlings showed initial growth improvements in an old walnut soil following pre-planting fumigation with Shell DD, Dowfume W85 or Shell Nemagon. Populations of root-lesion nematodes (*Pratylenchus vulnus*) increased rapidly after fumigation, but growth improvements were maintained by annual injections of Nemagon around the trees. (See also *H.A.*, 28: 294.]—Univ. Calif., Davis and Riverside.

2393. v.d. Brande, J., and Gillard, A.
Control of root nematodes by electric soil heating. [Flemish.]
Tuinbouwber., 1957, **21**: 63-4, from abstr. in *Informationsdienst Weihenstephan*, 1958, No. 1, p. 15.

Soil heating by electricity has given cheaper nematode control in glasshouses than steaming. When wire netting at a depth of 10–17 cm. had raised the temperature of the top soil to 55–56° C., nematodes were killed.

Mites.

(*See also* 2448v.)

2394. Morgan, C. V. G., and Anderson, N. H.
Notes on parathion-resistant strains of two phytophagous mites and a predacious mite in British Columbia.
Canad. Ent., 1958, **90**: 92-7, bibl. 14.

In 3 apple orchards in the Okanagan Valley, B.C., that received 3 sprays of parathion each year from 1951 to 1955, both the European red mite, *Metatetranychus ulmi*, and the apple rust mite, *Vasates schlechtendali*, developed strains resistant to parathion within 2 years. In 1954 and 1955 *M. ulmi* was more numerous on trees treated with parathion than on trees treated with the same number of DDT sprays. The predacious *Typhlodromus* mites were almost eliminated by parathion in the first 2 years, but thereafter *T. occidentalis* occurred in numbers as great as, or greater than those found on non-sprayed trees. It is not known whether this particular species of *Typhlodromus* is inherently tolerant of parathion or whether a resistant strain developed as a result of exposure to the acaricide.—Ent. Lab., Summerland, B.C.

2395. Morgan, C. V. G., Anderson, N. H., and Swales, J. E.
Influences of some fungicides on orchard mites in British Columbia.
Canad. J. Plant Sci., 1958, **38**: 94-105, bibl. 27.

In apple orchards in B.C. a fungicide schedule consisting of 4 to 7 sprays of lime-sulphur gave excellent control of *Metatetranychus ulmi*, but one spray applied at the pink stage gave control for only 2 months. Three summer sprays of elemental sulphur did not affect *M. ulmi*, but controlled *Tetranychus telarius* and *Vasates schlechtendali*. A schedule of ferbam gave good control of *Eotetranychus carpini borealis*. Four to 7 sprays of captan favoured increases in number of *M. ulmi* and *E. carpini borealis*. *M. ulmi* also increased in numbers after 5 applications of ziram. A schedule of glyodin did not control any species; in some cases the numbers of *M. ulmi* and *E. carpini borealis* increased after applications of this fungicide. A schedule of maneb controlled *M. ulmi* and *V. schlechtendali*, delayed the peaks in populations of *T. telarius* and *E. carpini borealis*, but allowed large numbers of *Bryobia arborea*. Manam compared favourably with maneb against *M. ulmi* and *T. telarius*. One spray of Karathane controlled any species if the application was timed correctly. Predatory mites, *Typhlodromus* spp., were not affected by glyodin but were reduced in numbers by ziram and nearly eliminated by maneb and Karathane. *Mediolata* sp. was slightly reduced in numbers by glyodin but maneb was somewhat more toxic and Karathane eliminated it. One spray of Karathane killed only 27% of *Stethorus picipes*. Ferbam, maneb and Karathane promoted tree vigour; large, healthy, dark-green leaves were characteristic of trees sprayed with these fungicides. [From authors' abstract.]—Ent. Div., Sci. Serv., Canad. Dep. Agric., Ottawa, Ont., and B.C. Dep. Agric., Vict.

2396. Downing, R. S.
Recent trials with new acaricides in British Columbia orchards.
Canad. J. Plant Sci., 1958, **38**: 61-6, bibl. 8.

In British Columbia the following acaricides gave good control of the European red mite, *Metatetranychus ulmi*, and the brown mite, *Bryobia arborea*, when applied to apple trees at the pink bud stage: chlorfensone (*p*-chlorophenyl *p*-chlorobenzene sulphonate), fensone (*p*-chlorophenyl benzene sulphonate), chlorbenside (*p*-chlorobenzyl *p*-chlorophenyl sulphide), Genite 923 (2,4-dichlorophenyl benzene sulphonate), Chlorobenzilate (ethyl 4,4′-dichlorobenzilate), and Kelthane (1,1-bis (chlorophenyl), 2,2,2-trichloroethanol). Trithion (0,0-diethyl S-(*p*-chlorophenylthiomethyl) phosphorodithioate) gave good control of the European red mite; it was not tested in the pre-bloom stage against the brown mite. A summer spray of Kelthane or Trithion gave good initial and residual control of European red mite and brown mite; Diazinon (0,0-diethyl-0-(2-isopropyl-4-methyl-pyrimidyl (6)) thiophosphate) gave fair initial control but lacked residual effectiveness. Chlorobenzilate gave good control of the brown mite, the only species against which it was tested in the summer. Chlorfensone and chlorbenside injured apple foliage when applied at the pink bud stage. Chlorfensone, chlorbenside and fensone injured the fruit of some varieties and Genite 923 severely injured apple foliage when used in summer. [From author's abstract.—Canad. Dep. Agric., Summerland, B.C.

2397. Madsen, H. F.
Chemicals on European red mite.
Calif. Agric., 1958, **12**(2): 8, 15.

The acaricidal effect of numerous sprays applied to pears and apples for aphis and codling moth control was assessed. Resistance to certain phosphate sprays was observed but others gave fair control of mites.

2398. Meltzer, J., and Dietvorst, F. C.
Action of tedion on eggs and ovaries of spider mites. [Dutch summary ¾ p.]
Tijdschr. PlZiekt., 1958, **64**: 104-10, bibl. 8.

Laboratory tests were carried out with eggs and adults of *Tetranychus urticae*. No differences in susceptibility to tedion were apparent in eggs up to 4 days old. Highest mortality occurred between the egg stage and the nymphochrysalis. Oral uptake of tedion by females of *Tetranychus* and *Metatetranychus ulmi* affected egg development in the ovaries.—N. V. Philips-Roxane, 's-Graveland.

2399. Kirby, A. H. M., and Bennett, M.
Phytotoxicity trials with acaricides on black currant and plum.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 152-4.

Two black currant varieties, Boskoop Giant and Wellington XXX, were sprayed at the grape stage with the following acaricides: lime-sulphur, 2% (3 years); fenson, 0·1% (3 years); chlorfenson, 0·1% (3 years); diphenyl sulphone, 0·2% (2 years); chlorbenside, 0·1% (2 years); chlorbenzilate, 0·1% (1 year); malathion, 0·09% (1 year). Apart from marginal scorch due to lime-sulphur in two years, no damage to leaf or fruit was seen. No crop losses were recorded, but in one year (1954) there were significantly larger crops on bushes receiving lime-sulphur or chlorfenson. Two plum varieties, Victoria and Early Laxton, were sprayed in 3 years with chlorfenson or chlorbenside, at 0·05%, at the time when sprays would be applied for control either of plum sawfly (mid-May) or of plum maggot (mid-June). No damage to leaf or fruit attributable to the acaricides occurred, and crops did not differ from those on the unsprayed control trees. [Authors' summary.]

2400. Mathys, G.
Étude des possibilités de lutte contre le tarsonème du fraisier (*Tarsonemus pallidus* Banks). **(Possible methods of controlling the strawberry mite.)**
Rev. romande Agric. Vitic., 1958, **14**: 26-8, bibl. 2, illus.

A single spray of Kelthane (0·3%) or Basudin (0·3%) before flowering is sufficient to control mild outbreaks of cyclamen mite on strawberries. When mite damage appears by mid-April, two sprays will probably be required, the first in mid-April followed by a second at the beginning of May. Post-harvest applications for mite control were also successful, and may prevent a population build-up in the autumn.

Insect pests.

(*See also* 2148, 2270, 2271, 2448d, j, o, r, t, y, z, 2449a, b, d, f, g, i, n, p, s, 3216, 3224, 3226j.)

2401. Vogel, W., and Wildbolz, T.
Befallsschwankungen bei einigen häufigen Schädlingen an Apfelbäumen. **(Variations in the incidence of some common apple pests.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 182-7.

Tables and graphs show the relationship that existed between incidence of the following insect pests (as estimated by counts of eggs or larvae on dormant wood) and rainfall in several areas of Switzerland during the period 1949/50–1957/58: (1) *Rhopalosiphum insertum*, (2) *Psylla mali*, (3) *Cheimatobia brumata*, (4) *tortrix moths*, (5) *Hyponomeuta malinellus*, (6) *Lecanium corni* and (7) *Quadraspidiotus piri*. The data clearly indicate that (1) and (2) were favoured by wet conditions and (5) by dry conditions.

2402. Collingwood, C. A., and Brock, A. M.
Spray timing and black currant pests.
Plant Path., 1958, **7**: 1-4, bibl. 2.

Spray schedules with endrin and kelthane were compared for control of blackcurrant pests. The best control of capsid (*Lygus pabulinus*) was obtained with sprays applied between flowering and fruit set. Control of aphids (*Hyperomyzus lactucae*) was in general rather poor especially with sprays applied after flowering. It is concluded that grape stage sprays, as normally applied, are too early for satisfactory control of the main blackcurrant pests, and a spray at full flower is recommended for adequate control of midge (*Dasyneura tetensi*) and capsid.

2403. Hill, C. H., and Hough, W. S.
Biology and control of Forbes scale.
The unspotted leaf miner.
Orchard mites.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 192-5, illus.

Forbes scale (*Aspidiotus forbesi*) on apples is naturally controlled by a predacious mite (*Hemisarcoptes malus*). Chemical control has been obtained by dormant oil sprays and by some organic phosphatic insecticides. Insect parasites are important in limiting a severe outbreak of the unspotted leaf miner (*Callisto geminatella*) on apples to 1 to 2 seasons. Larvae in the mines have been adequately controlled by parathion or nicotine sulphate sprays [see also *H.A.*, 26: 3561]. A single preblossom application of Kelthane, aramite or EM-923 gave effective control of European red mite up to mid-June. A good residual effect against mites on apple foliage was obtained with systox, thimet, Tetram R-6199 and guthion. The use of captan is associated with development of mite population, while glyodin appears to suppress mite development.

2404. Steiner, H., and Neuffer, G.
Eine netzunabhängige Insekten-Lichtfalle. **(An insect light trap independent of the public electricity supply.)** [English summary 4 lines.]
Z. PflKrankh., 1958, **65**: 93-7, bibl. 5, illus.

The trap described, which is fed by a 6-volt motor cycle battery, emits visible light and a small amount of UV light. The insects are caught alive.—Landesanst. PflSchutz, Stuttgart.

2405. Madsen, H. F., and Bailey, J. B.
Woolly and green apple aphids.
Calif. Agric., 1958, **12**(3): 14-16.

Woolly aphid on apple was successfully controlled by May and July sprays of Thimet at 1 quart of 48% emulsion/100 gal., or of diazinon at 1 lb. 25% wettable powder/100 gal. Thiodan was the best of the new materials tested. [For earlier work see *H.A.*, 28: 1272.] Good control of green aphid was obtained with Thimet, Guthion and Thiodan; the July application was the most important for aphid control.—Univ. Calif., Berkeley.

2406. Evenhuis, H. H.
Een oecologisch onderzoek over de appelbloedluis, *Eriosoma lanigerum* (Hausm.), en haar parasiet *Aphelinus mali* (Hald.) in Nederland. **(Ecological studies on the woolly aphid and its parasite in the Netherlands.)** [English summary 13 pp.]
Tijdschr. PlZiekt., 1958, **64**: 1-103, bibl. 105, illus.

It has been shown that the capacity of increase of woolly aphid is much greater than that of its parasite *Aphelinus mali*. In some years parasitism was low in early spring. These facts may explain the ineffectiveness of *Aphelinus mali* as a parasite in the Netherlands.—Inst. PlZiekt. Onderz., Wageningen.

2407. Besemer, A. F. H., and v. Dijke, J. F.
De bestrijding van de bloedvlekkenluis (*Sappaphis devecta* Wlk.). **(Control of *Sappaphis devecta*.**
Fruitteelt, 1958, **48**: 188-9.

Winter control treatments were not satisfactory against *Sappaphis*. Isolan (0·1%) and chlorthion (0·1%) applied as pre-blossom sprays gave temporary control, but an additional post-blossom spray of a systemic insecticide was required.

2408. Anders, F.
Reblaus- und colchicininduzierte Keulenbildung an der Wurzel von *Vitis*-Sämlingen. **(Phylloxera- and colchicine-induced club formations on the root of *Vitis* seedlings.)**
Naturwissenschaften, 1957, **44**: 95-6, from abstract in *Z. PflKrankh.*, 1958, **65**: 173.

In morphological, histological and cytological respects galls induced on vine roots by phylloxera saliva were indistinguishable from those induced by colchicine. Since many polyploid cells were found in the affected tissues of both types of gall, it is suggested that phylloxera saliva contains a nuclear poison with polyploidizing action.

2409. Henke, O.
Untersuchungen über die biochemischen Grundlagen der Reblausresistenz der Reben. **(Studies on the biochemical basis of phylloxera resistance in vines.)**
Phytopath. Z., 1958, **32**: 149-66, bibl. 43, illus.

Princ [reference not cited] suggested that a relationship exists between the presence of certain flavones and enzymes in vine leaves and leaf resistance to phylloxera. A reinvestigation by the author did not confirm these findings.—Inst. Phytopath., Naumburg (Saale).

2410. Stelzer, L. R.
The role of insecticides in the soils of Wisconsin orchards.
Diss. Abstr., 1957, **17**: 2359-60, being *Publ.* 24,329 of 85 pp.

In small scale experiments 3 lb. per acre of aldrin or dieldrin applied to grass plots gave 95–100% control of plum curculio larvae (*Conotrachelus nenuphar*), with persistence up to 4 years. In the field, heptachlor, aldrin and dieldrin at 3 and 6 lb. per acre were effective in reducing plum curculio damage to cherries, without affecting the general population of soil arthropods. Rates of 11 lb. per acre dieldrin and 5·6 lb. per acre heptachlor were effective in mouse control. Potted Montmorency and Early Richmond cherry trees were treated with insecticides at 100, 400 and 1,600 lb. per acre. No phytotoxicity was apparent in aldrin-, dieldrin- or heptachlor-treated trees, but applications of demeton, methyl parathion and lindane at 1,600 lb. resulted in phytotoxic symptoms. Aldrin and dieldrin treatments applied to a young cherry orchard had no significant effects on terminal growth or fruit quality. Dieldrin applications of 12 lb. per acre in a 2-year period significantly improved fruit flavour. No differences in soil fertility resulted from insecticidal treatments.—Univ. Wis.

2411. Klingler, J.
Der Einfluss von Kulturmassnahmen auf den Dickmaulrüssler-Befall. **(The effect of cultural measures on vine weevil infestation.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 237-9, bibl. 3.

Growing vines on their own roots, scion-rooting of grafted vines and root formation near the soil surface were found to favour *Otiorrhynchus sulcatus* infestation. [See also *H.A.*, 28: 318.] —Wädenswil.

2412. Graham, C., and Krestensen, E. R.
A residual spray for control of the periodical cicada.
J. econ. Ent., 1957, **50**: 713-15, bibl. 4, illus.

In small scale tests Sevin (N-methyl-1-naphthyl carbamate) at 2 lb. in 100 gal. gave complete control of cicadas (*Magicicada septendecim*) emerging from the soil around the trunks of sprayed apple trees, and also of those flying in from adjacent areas, for a period of 6 days. The material remained partially effective for up to 10 days. On 2 large plots consisting of 90 apple trees each Sevin at 2 lb. and 6 lb. in 100 gal. gave complete control of cicadas for 3 weeks without either of the concentrations causing any apparent injury to the fruit or foliage.—Univ. Md Field Stat., Hancock.

2413. Puzzi, D., and Orlando, A.
Experiência de campo para o combate das miscas das frutas—*Ceratitis capitata* (Wied.) e *Anastrepha mombinpraeoptans* (Sein.) realizada no ano de 1957. **(Field experiments carried out during 1957 on control of the fruit flies *Ceratitis capitata* and *Anastrepha mombinpraeoptans*.)**
Biológico, 1958, **24**: 9-12, bibl. 6.

After 8 treatments of peach trees at 12-day intervals with 1 l. per tree of 5% molasses containing 0·1% dieldrin, fruit infested by one of both pests amounted to only 5·3% of the total, compared with 12·6% when the insecticide was 0·2% malathion, 15% when it was 0·02% parathion and 51% from untreated trees. In a large orange orchard attacked by *Ceratitis* fruit infestation was reduced from 50% to 2% by systematic spraying with the molasses/parathion mixture. [For earlier work see *H.A.*, 27: 2796.]

2414. Ministre de l'Agriculture de France.
État actuel de la lutte contre la mouche des fruits. **(Present position with regard to control of the Mediterranean fruit fly.)**
Bull. Inf. Cabin. Minist. Agric. Fr., No. 27, reproduced in *Terre maroc.*, 1958, **32**: 121-3.

Disinfestation of rubbish dumps and baiting in orchards are valuable supplementary measures to insecticidal treatments. Neither phosphoric esters nor lindane will remain effective sufficiently long to be economic, but DDT at about 250 g. of active material per 100 l. is advised, the emulsion for peaches and the wettable powder for citrus and other fruits. Addition of hydrolysed proteins as bait has given promising results. The trees are treated 18–20 days before the anticipated date of ripening, and if the baited traps suggest a heavy attack a second treatment may be given, using lindane if within the 15-day period required between application of DDT and harvesting.

2415. Marucci, P. E.
Malathion bait sprays for the control of blueberry maggot.
26th annu. Blueberry Open House, N.J. agric. Exp. Stat., 1958, pp. 19-21.

In 2 pilot tests promising control of blueberry maggot [*Rhagoletis pomonella*] was obtained by malathion sprays baited with yeast hydrolysate. In a commercial plot aerial application of baited malathion sprays also gave excellent results.

2416. Pitcher, R. S.
The biology of the black currant leaf midge, *Dasyneura tetensi* (Rübs.), in relation to the planning of control measures.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 136-9, bibl. 7.

Parathion and similar compounds usually give good control of the midge in nurseries but cannot be safely used in fruiting plantations. In the latter DDT is commonly applied at the "grape" stage, but the degree of control obtained is erratic. In this paper observations on the biology of the midge, extending over 6 seasons, are described. They throw light on the shortcomings of past control measures and suggest ways in which these could be improved in the future.

2417. Summers, F. M., and Ross, N. W.
Twig borer control.
West. Fruit Gr, 1958, **12**(2): 17-18, illus.

There are indications that peach twig borer [*Anarsia lineatella*] is becoming resistant to DDT sprays in California. Recent experiments have shown that very good control can be obtained by substituting parathion for DDT in sprays against the first 2 broods. It is recommended that parathion 25-W should be applied at 2 lb./100 gal./acre at the pink bud and 90% petalfall stages and again in May.

2418. Tihonov, N. P.
A dangerous orchard pest. [Russian.]
Sad i Ogorod, 1958, No. 3, pp. 73-4, illus.

A note on the possible danger of introducing into the U.S.S.R. *Carposina sasakii*, which damages apples, pears, peaches and other fruits. In the Korean People's Republic good control was obtained by spraying with 1% mineral-oil emulsion with DDT or with 4% DDT suspension. BHC is also used for soil treatment or orchard fumigation.

2419. Savary, A.
La lutte contre les vers de la vigne: cochylis (*Clysia ambiguella* Hb.) et eudémis (*Polychrosis botrana* Schiff.). **(Control of the grape moths, *Clysia ambiguella* and *polychrosis botrana*.)**
Rev. romande Agric. Vitic., 1958, **14**: 42-4, illus.

Insecticides may be applied at 3 periods, viz. at the start of egg-laying, just before hatching and when the first signs of damage appear. DDT-based insecticides may be used for the first treatment, and organic phosphorus materials for the later applications.—Stats féd. d'Essais agric., Changins-sur-Nyon.

2420. Liebster, G., and Pesserl, G.
Der Schattenwickler als Schädling an Erdbeeren. **(*Cnephasia wahlbomiana* as a pest of strawberry.)**
Reprinted from *ErwObstb.*, *Ausgabe B*, [1958?], pp. 9-11, bibl. 6, illus.

In 1956 and 1957 the strawberry plantation of the

Institut für Obstbau, Weihenstephan, Munich, was attacked by a new pest, *Cnephasia wahlbomiana* L. [=*C. virgaureana* Treitsch]. The injuries caused to foliage and flowers are described and the biology of the pest is discussed. Experiments on its control are still in the preliminary stage.

2421. MacLellan, C. R.
Role of woodpeckers in control of the codling moth in Nova Scotia.
Canad. Ent., 1958, **90**: 18-22, bibl. 18.

The eastern hairy woodpecker and the northern downy woodpecker are both important in control of the codling moth in Nova Scotia. In the years 1950 to 1956 these birds reduced the overwintering larval population on tree trunks by 52%. [From author's summary.]—Sci. Serv. Lab., Kentville.

2422. Hamilton, D. W., and Cleveland, M. L.
Control of the codling moth and other apple pests with ryania.
J. econ. Ent., 1957, **50**: 756-9.

In field and field-laboratory studies in New York and Indiana ryania at 6 lb. in 100 gal. gave good control of codling moth (*Carpocapsa pomonella*) on apples and compared favourably with DDT. The addition of nicotine-oil materials to 3–4 lb. of ryania improved results by reducing the number of stings on the fruit. A ryania programme gave good control of other apple pests in a young orchard, and with the help of a dormant oil-dinitrocresol spray kept orchard mites under control, though not so effectively as the check DDT-malathion programme. Under conditions of poor spray coverage neither a ryania nor a DDT-parathion programme was satisfactory in a mature orchard, and in the ryania block the leafhopper *Erythroneura lawsoniana* built up to high proportions and 2 applications of ovex were needed to check increases of European red mite, *Panonychus* (=*Metatetranychus*) *ulmi*. Beneficial insects appeared to be more abundant in the ryania plots than in the DDT-parathion or DDT-malathion plots.—Ent. Res. Div., U.S.D.A.

2423. Pickett, A. D., and Patterson, N. A.
Some observations on the 1957 spray program.
A.R. N. Scotia Fruit Grs' Ass. 1957, pp. 171-2.

Ryanicide 50 at 6 lb. (3 lb. actual ryania) per 100 gal. gave better control of codling moth than Ryanicide 100 at 5 lb. (5 lb. actual ryania). Apple quality was not affected by ryania sprays, which only slightly affected fruit colour. In a modified spray programme lead arsenate has given satisfactory control of grey-banded leaf roller, and nicotine sulphate has given the best control of apple sucker.—Sci. Serv. Lab., Kentville, N.S.

2424. Hough, W. S.
Codling moth resistance to DDT.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 191-2.

Codling moth injury to apples was more severe in orchards regularly sprayed with DDT than in those where insecticides had not been previously used. A strain of codling moth known to be somewhat resistant to DDT may be more difficult to control by lead arsenate or parathion. In practice a combined spray of DDT and parathion has been used for control of DDT resistant strains. A new nematode disease of codling moth larvae has been discovered.

2425. Solaroli, V.
La difesa del pesco dalla *Laspeyresia* (*Cydia*) *molesta* Busck. (**Protection of peaches against** (***Laspeyresia (Cydia) molesta.***) [English, French and German summaries 2 lines each.]
Frutticoltura, 1958, **20**: 127-31, illus.

The 4 series of treatments tested all gave highly satisfactory results, but differed in cost of material. The lowest cost (for insecticide only) was for 5 treatments at weekly intervals with 0·08% emulsion of 50%-active parathion, that for 3 fortnightly sprayings with 0·08% emulsion of 60%-active diazinone being about twice as high. The costs for 5 weekly applications of 0·25% suspension of 50%-active dimethyltrichloro-oxy-ethylene-phosphene or 3 fortnightly sprayings with 0·7% emulsion of a mixture of 10%-active parathion and 40%-active DDT, were both about 3 times that of the parathion series.

2426. Böhm, H.
Zum Auftreten des Fruchtschalenwicklers *Capua* (=*Adoxophyes*) *reticulana* Hb. in Österreich. (**On the incidence of the summer fruit tortrix in Austria.**) [English summary ¾ p.]
PflSch. Ber. Wien, 1957, **19**: 159-75, bibl. 13, illus.

In Austria this pest develops 2 generations a year and hibernates as a caterpillar. It causes fruit injury to apple and pear and leaf injury to many other fruit trees and ornamentals. Control was achieved by a winter application of DNOC and a pre-blossom treatment with one of the synthetic insecticides.

2427. López Cristóbal, U.
Una polilla de los frutales, poco conocida *Eulia sphaleropa* Meyrich (Lepidoptera-Tortricidae). (**A little known fruit moth, *Eulia sphaleropa* (Lepidoptera-Tortricidae).**)
Rev. Fac. Agron. Univ. La Plata, 1957, **33**: 93-6, illus.

Plums, pears and apples are most frequently attacked, but the third generation of the season may severely damage citrus fruits. The pest is controlled in plum, peach, pear and apple orchards by spraying at petal fall with 250 g. of 50% wettable DDT per 100 l. of water and repeating weekly.

2428. Retan, A. H., and others.
Filbertworm control trials.
Calif. Agric., 1958, **12**(4): 10-11.

In 2 experimental walnut orchards Guthion and Sevin have given promising control of filbert worm [*Melissopus latiferreanus*]. Applications of Guthion or Sevin on August 20 in one orchard gave effective control of filbert worm, but the application of Guthion on September 4 had no suppressing effect.

2429. ANTHON, E. W., AND OTHERS.
Insect control research.
West. Fruit Gr, 1958, **12**(3): 40-2.

Commercial control of pear psylla was obtained by pre-pink and shuck sprays of DDT plus parathion, with a late summer spray of parathion. Thimet, phosdrin and systox have all given excellent control of green peach aphid when properly applied. Tests on some new insecticides and acaricides are summarized.

2430. FERRÃO, J. E. M.
A *Hoplocampa brevis* Klug. Contribuição para o seu estudo em Portugal. (***Hoplocampa brevis*. Contribution to its study in Portugal.**) [English summary ½ p.]
Publ. Lab. Pat. veg., Lisboa **12**, 1958, pp. 92, bibl. 80, illus.

In experimental tests *Hoplocampa brevis* did not attack fruit trees other than pears. Data from studies on the effect of weather, tree height and illumination on the intensity of attack were used to prepare a tentative plan of treatment, concentrating on controlling the adult phase. Insecticides with good residual action are necessary at bud burst to combat the adults and at petal fall to kill larvae.

2431. MITIĆ-MUŽINA, N., AND ŽIVANOVIĆ, V.
Rezultati ispitivanja cijanizacije voćnog sadnog materijala. (**An investigation on HCN fumigation of fruit tree nursery plants.**) [English summary ½ p.]
Zasht. Bilja, 1957, No. 39-40, pp. 56-60, bibl. 3.

Fumigant treatment of nursery transplants with 10·5, 15, 20 or 30 g. of HCN per cu.m. for 1 or 1½ hours at 10–20° C. gave complete control of San José scale. Calcium cyanide plus sulphuric acid at 15–20 g. per cu.m. gave similar results. Plants treated at 20 g. per cu.m. showed no injury after planting out.

2432. PROTOPOPOVA, G. V.
New preparations for San José scale control. [Russian.]
Sad i Ogorod, 1958, No. 3, pp. 60-1.

In Transcarpathia on 10–15-year-old Jonathan apple trees excellent control of San José scale was obtained with the following sprays: 2% DDT emulsion+DNC suspension at 0·3–0·5% in early spring or autumn and at 0·1% during the summer; vofatox suspension at 5–7% in spring or autumn and at 4% in the summer; and vofatox emulsion at 3–6% in spring or autumn and at 0·5% in the summer. Very satisfactory results were also obtained with emulsions of preparations No. 23 and No. 25 applied during the summer at 2–3% concentration.

2433. BOURNIER, A.
Drepanothrips reuteri Uzel, le thrips de la vigne. (**The vine thrips.**)
Ann. Éc. Agric. Montpellier, 1957, **30**: 145-57, bibl. 11, illus.

The biology of and damage caused by *Drepanothrips reuteri* are described. Sprays usually give more effective control of Thysanoptera than dusts, and DDT, lindane and parathion are recommended. Two protective sprays are suggested, the first after bud burst and the second 10 days later.

Other pests.

(*See also* 2410, 2448b, n, 2535.)

2434. WOLFE, H. R.
Effect of endrin sprays for mouse control on insects found on orchard cover crops.
J. econ. Ent., 1957, **50**: 837-8, bibl. 3.
Endrin spray for orchard mouse control.
Proc. Wash. St. hort. Ass., 1957, pp. 230-4, bibl. 6.

When the entire cover crop of alfalfa in a peach orchard was sprayed with endrin at 1·2–2·4 lb./ac. for mouse control, very good kill was obtained of lygus bugs, stink bugs, leafhoppers and aphids. Where the tree rows only were sprayed the sucking insect populations were greatly reduced, the smallest reduction being among aphids.—St. Coll. Tree Fruit Exp. Stat., Wenatchee.

2435. FEDJUŠIN, A. V.
White partridge, a potential orchard pest. [Russian.]
Priroda, 1958, **47**(3): 113-14, bibl. 1, illus.

In Siberia the birds have been observed breaking off the growing points and pecking out the flower buds, in particular on apple trees.

2436. PRZYGODDA, W.
Auswirkungen einer Maikäferbekämpfung mit Dieldrin auf den Vogelbestand und die Einwirkung von E 605 forte auf Jungvögel (Nestlinge). (**The effect of dieldrin used for chafer control on bird population and of E 605 on young birds.**)
Ornithol. Mitt., 1957, **9**: 67-78, from abstr. in *Anz. Schädlingsk.*, 1958, **31**: 31-2.

There was a high rate of bird mortality after spraying trees with lindane and dieldrin (200 g./ha.) for chafer control, and it is considered that dieldrin was the active agent. Young tits were killed by parathion doses in laboratory studies, but the author suggests that a material such as dipterex, which is less toxic to humans, would be preferable for bird control.

Fungicides.

(*See also* 2228, 3031.)

2437. CARLONE, R.
Effetti collaterali di un fungicida acuprico sul melo. (**Side effects of a non-copper fungicide on apples.**) [English, French and German summaries 8-10 lines each.]
Frutticoltura, 1958, **20**: 43-52, illus.

Captan at 250 g. per hl. (i.e. 0·25%) was sprayed twice in August and once in September on Delicious and Golden Delicious apple trees. Fruit colour developed earlier and was more intense on treated than on control trees of Delicious. On Golden Delicious there was a higher percentage of well coloured fruit at harvest than on control trees and the area per fruit suffused with red was greater. Fruit skins were smoother, much less affected by russeting, and had a thinner cuticle. Ripening was advanced about 20 days in Golden Delicious and a month in Delicious, but no improvement in storing quality resulted from the captan treatment.

2438. Huguet, F.
Alimentation foliaire et traitements fongicides de la vigne. **(Foliar nutrition and fungicidal treatments of vines.)**
Ann. agron., 1957, **8**: 737-9.

Captan at 0·25% and burgundy mixture at 2% were each applied separately, or in combination with a mixture of 0·7% urea and 0·7% potassium nitrate, as foliar sprays. Numerical data are quoted to compare the effects on yield of grapes, yield of sugar, and leaf composition at different stages of the growth cycle. Captan gave higher yields per plant of grapes and sugar than the copper fungicide. Foliar application of N and K increased the proportions of these elements in the leaves, tended to increase leaf S, and in the early stages to decrease leaf P, but gave lower yields of fruit and sugar than those from fungicidal treatment alone.

2439. Kirby, A. H. M., and Bennett, M.
Further phytotoxicity studies with phenylmercuric chloride on Conference pear.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 148-51, bibl. 2.

Spray schedules, based on a wettable powder containing phenylmercuric chloride (PMC), have been applied in 3 seasons to young trees of Conference pear [controls being provided by non-sprayed trees and by a sulphur programme in one year]. Leaf damage was caused by complete schedules (2 pre- and 2 post-blossom applications) at 0·01, 0·005 or 0·0025% PMC, and even by a single application at 0·005% at petal-fall. Reduced fruit-set and severe loss of picked crop were caused by the full schedules, and by 2 applications at 0·01% PMC applied post-blossom only. Unlike damage by this fungicide to apple, damage to pear does not appear to depend upon wet weather following application, nor is it confined to hot, dry weather, but is likely to follow post-blossom application in any season. [From authors' summary. See also *H.A.*, 22: 2451.]

Insecticides.

(*See also* 2448m, 2449r, 3181, 3194.)

2440. Wilcox, J., and Howland, A. F.
Systemic insecticides applied in low- and high-gallonage sprays on strawberry, lima bean, and swiss chard.
J. econ. Ent., 1957, **50**: 800-1.

In southern California high-volume sprays tended to be better than low-volume sprays against *Tetranychus telarius* on strawberries and lima beans and against *Myzus persicae*, *Aphis fabae* and *Macrosiphum* sp. on swiss chard. None of the treatments was phytotoxic.

2441. Besemer, A. F. H., Onrust, J. C., and Blok, J. J.
Vruchtverruwing als gevolg van bespuitingen met fosforesters kort na de bloei. **(Fruit russeting as a result of post-blossom sprays of phosphoric esters.)**
Fruitteelt, 1958, **48**: 177-9, illus.

Sprays of parathion wettable powder applied shortly after flowering caused fruit russeting on Golden Delicious and Goudreinette. Less serious effects were obtained with malathion and diazinon, and fruit was undamaged by lindane/DDT treatment. Russeting by parathion was much less severe when sprays were applied in June or later.

2442. Klotzsche, C.
Neue insektizide Phosphor- und Phosphonsäureester. **(New insecticidal phosphoric and phosphonic acid esters.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1958, **10**: 60-3, bibl. 5.

Animal tests showed that (I) 0,0-diethyl-S-(4-chlorobenzyl)-thionophosphate (Eradex) and (II) 0,0-dimethyl-S-[(2-isopropyl)-ethylsulphoxide]-phosphate are less toxic than E 605 and systox. Of the comparable, more recent phosphoric acid ester insecticides only malathion gave more favourable results than (I), while the systemic compound (II) proved distinctly less toxic than metasystox. Two other new insecticidal compounds, dimethyl-[diethylamido-1-chlorcrotonyl-(2)] phosphate (Phosphamidon) and β-chlorcarbethoxy - dichloromethyl - phosphonicaciddiethyl - ester (Fosfinon) are rejected because of their high toxicity. —Max-von-Pettenkofer-Inst., Berlin-Dahlem.

2443. Haines, R. G.
Results of field experiments with new insecticides and acaricides on Michigan fruit.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 628-36.

Five promising non-phosphatic and 4 phosphatic acaricides are listed. In experimental blocks of apples the best control of mites, including parathion-resistant types, was obtained with pink-bud plus mid-summer applications of, alternately, phosphate and non-phosphate materials. Kelthane was the most efficient material for control of 2-spotted mites [*Tetranychus bimaculatus*] on red currant. Guthion (0,0-dimethyl-S-4-oxo-3H-1,2,3-benzotriazine-3-methyl-phosphorodithioate) and Sevin (N-methyl-1-naphthyl carbamate) gave outstanding control of codling moth and red-banded leaf roller [*Argyrotaenia velutinana*]. Phosdrin also gave satisfactory control of leaf roller. Promising control of oriental fruit moth on peaches was obtained with Guthion and Sevin. A combined pre-blossom spray of DDD and dieldrin is recommended for infestations of leaf rollers and *Philaenus leucophthalmus* on strawberries.

Spray residues.

2444. Dewey, J. E.
Utility of bioassay in the determination of pesticide residues.
J. agric. Food Chem., 1958, **6**: 274-81, bibl. 107.

Bioassay techniques for the quantitative determination of chemical residues are reviewed. Among the organisms used are certain plants such as beans, pea and tomato, mainly for growth substance and herbicide residues.—Cornell Univ., Ithaca.

2445. Bishop, R. F., and Chisholm, D.
Arsenical spray deposits on the fruit and foliage of apple trees.
A.R. N. Scotia Fruit Grs' Ass. 1957, pp. 165-8, bibl. 3.

On the basis of one season's trials it is suggested that fruit should not be harvested sooner than 8 weeks after application of the last spray, if arsenical deposits on the fruits are not to exceed 2 p.p.m.

2446. Herne, D. C., and Chisholm, D.
Accumulation of DDT in the soil of an Ontario peach orchard.
Canad. J. Soil Sci., 1958, **38**: 23-6, bibl. 5.

An Ontario peach orchard in which known amounts of DDT had been applied as foliage sprays was used to study the accumulation and distribution of this insecticide in the soil. Run-off from the foliage at the time of spraying was an important factor in the rate of DDT accumulation. Approximately 95% of the accumulated insecticide was retained in the cultivated layer, and the amounts near the trunks of the trees were significantly greater than those under the peripheries of the trees or midway between adjacent trees. [Authors' abstract.]

2447. Butler, L. I., and Westlake, W. E.
Demeton residues on fruits, vegetables, and forage crops.
J. econ. Ent., 1957, **50**: 737-9, bibl. 2.

The residual amounts of demeton were determined in treated crops which included beetroot, melon, pea, strawberry, loganberry, apple, pear, cherry, apricot, peach and prune. The material was concentrated in the leaves, only small amounts being found in the fruits and roots. The persistence of a high concentration of demeton in apple leaves for almost 2 months after application was unexpected and in contrast to amounts found in leaves of other plants. The possible reason for this is discussed.—Ent. Res. Div., U.S.D.A.

Noted.

2448.

a Adamič, F.
Nevarno odmiranje breskev in stanje prehrane v nasadih. **(The decline of peach trees as affected by nutrition.)** [English and German summaries ½ p. each.]
Zborn. Kmet. Gozd., 1957, No. 3, pp. 87-122, bibl. 63, illus.
Due to deficiencies of major and minor elements. Leaf symptoms described.

b Anon.
This simple trap keeps down orchard bird damage.
Comm. Gr, 1958, No. 3243, p. 437, illus.
Based on the luring effect of a single call bird.

c Blommers, J.
De bestrijding van de bladvalziekte bij zwarte bes. **(Control of black currant leaf fall.)**
Fruitteelt, 1958, **48**: 176.
Three sprays of 0·4% zineb gave the best results.

d Broszkus, W., Adlung, K. G., and Madel, W.
Lepidopterologische Beobachtungen in einer Ingelheimer Apfelanlage mit besonderer Berücksichtigung der Tortriciden. **(Observations on Lepidoptera in an apple orchard at Ingelheim, with particular reference to tortricids.)**
Anz. Schädlingsk., 1958, **31**: 20-3, bibl. 20, illus.
Adoxophyes orana controlled with 50% malathion-emulsion sprays.

e Cant, R. R., and Till, M. R.
After effects of the river Murray flood on orchards and vineyards.
J. Dep. Agric. S. Aust., 1958, **61**: 285-90, illus.
Including factors affecting susceptibility of fruit trees and vines to flooding and seepage.

f Cation, D.
Comparison of fungicides for control of cherry leaf spot in 1956 and 1957.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 609-19.
See *H.A.*, 28: 1249.

g Chollet, C. C., and Sprague, R.
Control of bull's eye rot of apple in North Central Washington.
Plant Dis. Reptr, 1958, **42**: 499.
Maneb sprays gave control of *Gloeosporium perennans* comparable to that obtained with zineb.—Wash. agric. Exp. Stats.

h Cordy, C. B., and MacSwan, I. C.
Fireblight control.
West. Fruit Gr, 1958, **12**(2): 31-2, illus.
On pears, by cutting out infections and spraying with copper, streptomycin or ziram.—Ore. St. Coll.

i Cunningham, G. H., and Atkinson, J. D.
Certification of therapeutants and plant hormones.
Inf. Ser. N.Z.D.S.I.R. **13**, 1957, pp. 21.
A revision of 1956 edition [*H.A.*, 27: 337g].

j Čurakov, A. M., and Pigarova, E. N.
Gypsy moth control. [Russian.]
Sad i Ogorod, 1958, No. 3, pp. 59-60.
On fruit, ornamental and forest trees with 8% DDT in diesel oil applied by an aerosol generator.

k Dahlmans, H.
Nachtvorstwering door beregening. **(Frost protection by sprinkler irrigation.)**
Fruitteelt, 1958, **48**: 456-7, illus.
Tests on apples and blackcurrants.

l Davey, J. B.
Avoid fertilizer burn in strawberries.
Qd agric. J., 1958, **84**: 145-8, illus.
Symptoms of fertilizer excess and recommendations for correct levels of application.

m Dunegan, J. C., and Wilson, R. A.
Growth of peach trees in soils treated eleven years previously with DDT.
Plant Dis. Reptr, 1958, **42**: 262-3, bibl. 1.
No toxic effect remained.

n (Fennessy, B. V.)
Rabbit control in New Zealand.
Leafl. C.S.I.R.O. **20**, 1958, pp. 8.
Legislative control of rabbits, by subsidized Rabbit Boards, and decommercialization of trade.

o Foott, J. H., and Summers, F. M.
Oriental fruit moth control.
West. Fruit Gr, 1958, **12**(4): 39-40, illus.
A popular account of control by aerial DDT dusting.

p FRANZ, J.
Bibliographie über biologische Bekämpfung. II. **(Bibliography on biological control. II.)** [Headings in German, French and English.]
Reprinted from *Entomophaga*, 1957, **2**: 293-311.
Of pests and weeds. Part I appeared *Ibidem*, Vol. 1, No. 1, 1956. The object is to list all relevant articles published in 1955 and later.

q FULTON, R. H., AND LOVITT, D. F.
The Michigan virus free strawberry certification program.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 575-80, illus.

r GLASS, E. H.
Red banded leaf roller—1957 and 1958.
Proc. N.Y. St. hort. Soc., 1958, pp. 66-72.
Recommendations for control of resistant strains.

s GUBA, E. F.
Pertinent aspects of the infection cycle and control of the peach canker pathogen, *Fusicoccum amygdali*.
Plant Dis. Reptr, 1958, **42**: 481-92, bibl. 2, illus.
Including a spray programme for its control.

t GUDERIAN, R., AND PLÜGHAN, A.
Über die Wirtschaft mit Pflanzenschutz- und Schädlingsbekämpfungsmitteln in 25 Ländern der Erde. **(On the production of and trade in plant-protective chemicals and insecticides in 25 countries.)** [Russian and English summaries 16 lines each.]
Albrecht Thaer Arch., 1957, **2**: 87-153, bibl. 43, maps.

u IRWIN, R. W., AND TIESSEN, H.
Note on an automatic start device for frost control by sprinkler irrigation.
Canad. J. Plant Sci., 1958, **38**: 118-19, bibl. 1, illus.
Developed at the Ontario Agricultural College, Guelph, to start the sprinkler system at a critical temperature.

v KRIEGLER, P. J.
Red spider resistive to parathion.
Dec. Fruit Gr, 1957, **7**: 268-9, illus.
Kelthane is recommended for apples and pears, and dimite for pears, at 1½ lb. and 1 pint per 100 gal. water respectively.

w LANDBRUKSTEKNISK INSTITUTT, VOLLEBEKK, NORWAY.
Sammenliknende prøver med ryggtåkesprøyter. **(Comparative tests with knapsack mist sprayers.)** [English summary 6 pp.]
Meld. LandbrTek. Inst., Vollebekk **55**, 1958, pp. 42, illus., kr. 2.
Two years' tests with 3 models.

x MAASSEN, H.
Acyrthosiphon pelargonii ssp. *rogersii* Theob. als Vektor von Erdbeerviren in Mitteldeutschland. **(*Acyrthosiphon pelargonii* spp. *rogersii* as a vector of strawberry viruses in Central Germany.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1958, **12**: 39-40, bibl. 6, illus.

y MADSEN, H. F., AND BAILEY, J. B.
Codling moth control research.
West. Fruit Gr, 1958, **12**(4): 35-6, illus.
Short notes on newer insecticides as possible substitutes for D.D.T.

z MINISTRY OF AGRICULTURE, LONDON.
Codling moth.
Adv. Leafl. Minist. Agric. Lond. **42**, amended 1958, pp. 4, illus.
Description, damage and control.

2449.

a MINISTRY OF AGRICULTURE, LONDON.
Slugs and snails.
Adv. Leafl. Minist. Agric. Lond. **115**, revised 1958, pp. 7, illus.
Species, damage and control.

b MINISTRY OF AGRICULTURE, LONDON.
Currant and gooseberry aphids.
Adv. Leafl. Minist. Agric. Lond. **176**, revised 1957, pp. 6, illus.
Ten species.

c OOSTENBRINK, M., KUIPER, K., AND S'JACOB, J. J.
Tagetes als Feindpflanzen von *Pratylenchus*-Arten. **(*Tagetes* as a suppressor of *Pratylenchus* species.)** [English summary ½ p.]
Nematologica, 1957, **2**: 424S-33S, bibl. 6, illus.
Tagetes spp. reduced *Pratylenchus* populations by about 90%. [See also *H.A.*, 28: 1317e.]

d PAPWORTH, D. S.
Practical experience with the control of ants in Britain.
Ann. appl. Biol., 1958, **46**: 106-11, bibl. 12.
With dieldrin or chlordane.

e POSNETTE, A. F.
Virus diseases of fruit trees.
Amer. Nurserym., 1958, **107**(7): 15, 63-5, illus.
Losses caused by virus diseases, especially those not showing leaf symptoms.

f PRIOL, J.
Rezultati bioloških poskusov za zatiranje ameriškega kaparja. **(Trials on the control of San José scale.)** [English summary ½ p.]
Zborn. Kmet. Gozd., 1957, No. 3, pp. 123-36, bibl. 16, illus.
On apples at the Fruit Research Institute, Maribor, 1946–49.

g PUTTARUDRIAH, M., AND USMAN, S.
Insect pests of horticultural crops.
Lal-Baugh, 1957, **2**(2-3): 69-102, illus.
In Mysore; with control measures.

h Schellenberg, A.
Der Frostschutz im Weinbau mit Strohschirmen. **(Frost protection of vines by straw covers.)**
Schweiz. Z. Obst- u. Weinb., 1958, **67**: 205-11, illus.
Their economical use.

i Schneider, F.
Some insect pests of pistachio in Syria.
FAO Plant Prot. Bull., 1958, **6**: 65-71, bibl. 10, illus.
Capnodis cariosa, *Chaetophorus vestitus*, *Pachypasa otus* and *Schneidereria pistaciella*, and short notes on control.

j Schnelle, F., and Breuer, W.
Meteorologische Messgeräte und Voraussetzungen für den Schorfwarndienst. **(Meteorological recording instruments and prerequisites for a scab warning service.)**
Ber. dtsch. Wetterdienst., 1958, **6**(41): 1-22, bibl. 19, illus.
Among others an instrument is described which records onset and duration of apple leaf moistening by rain or dew.

k Staehelin, M., and Bolay, A.
La tavelure du pommier. I. Peut-on lutter curativement contre la tavelure du pommier? **(Apple scab. I. Can one use curative control for scab?)**
Rev. romande Agric. Vitic., 1958, **14**: 15-17, bibl. 5, illus.
Only as a supplement to preventive control.

l Staehelin, M., and Bolay, A.
La tavelure du pommier. II. Observations et expériences en 1956 et 1957. **(Apple scab. II. Observations and experience in 1956 and 1957.)**
Rev. romande Agric. Vitic., 1958, **14**: 31-3, bibl. 2, illus.
Captan and TMTD sprays gave satisfactory control of scab when applied 20–40 hours after the start of critical infection periods.

m Stapley, J. H.
Spray techniques: the development of low volume spraying.
Commonw. phytopath. News, 1958, **4**: 1-6, illus.
A review.

n Thomas, I., and Janson, H. W.
Common names of British insect and other pests.
Tech. Bull. Minist. Agric. Lond. **6**, 1957, pp. 49, H.M.S.O., 7s. 6d.
Scientific: common, and common: scientific; an aid to editorial accuracy.

o Toorenaar, G.
Het windscherm van populieren. **(Poplars as windbreaks.)**
Fruitteelt, 1958, **48**: 325, illus.
Varieties and pruning.

p Toshima, A., and Horiuchi, F.
Study of the effect of DDT, BHC and organic phosphorus chemicals on the peach fruit moth as a pest of apple. [Japanese, with English summary ½ p.]
Reps Tohoku nat. agric. Exp. Stat., 1957, No. 11, pp. 39-51, bibl. 11.
DDT and BHC were ineffective but folidol, parathion and malathion were effective as ovicides and EPN as a larvicide.

q Tweedy, B., and Powell, D.
Charcoal rot on strawberry in Illinois.
Plant Dis. Reptr, 1958, **42**: 107, bibl. 5.
Possible control of *Botryodiplodia phaseoli* by late summer irrigation.

r Union Carbide International Company.
Sevin insecticide, an outstanding new experimental pesticide for apples.
News Release Union Carbide int. Co., N.Y. **RG-12E57**, 1957, pp. 3.
Results of tests with 1-naphthyl N-methyl carbamate.

s Vereščagin, B. V.
Protection of plum orchards from *Parthenolecanium corni*. [Russian.]
Sad i Ogorod, 1958, No. 3, p. 75.
By spraying with 1% selinon (DNC).

t Woodhead, C. E.
Collar rot and root rot of apples in Nelson and Marlborough.
N.Z. J. Agric., 1958, **96**: 45-52, bibl. 2, illus.
See *H.A.*, 28: 265.

WEEDS AND WEED CONTROL.

General.

(*See also* 2511b, l-n.)

2450. Helgeson, E. A.
Methods of weed control.
FAO agric. Stud. 36, 1957, pp. x + 189, bibl. 73, illus., $2.00 or 10s.

The main emphasis, in this very useful publication, is on ready reference to practical weed control methods. Notes on some principles of weed control are followed by a description of cultural, mechanical and chemical methods of control, properties and action of individual herbicides, and equipment. Further, an account is given of the control of aquatic weeds and woody plants, of methods used in turf, sugar cane, rubber, ornamental nurseries, fruit, vegetables and gladiolus, and of means of controlling 41 important weeds. To make this compilation more helpful there are appendices dealing with the reaction of both weeds and crop plants to 5 herbicides, definitions of terms, designations of herbicides and conversion factors for weights and measures.

2451. Orgell, W. H., and Weintraub, R. L.
Influence of some ions on foliar absorption of 2,4-D.
Bot. Gaz., 1957, **119**: 88-93, bibl. 10.

The influence of several cations and anions on penetration of 2,4-D into leaves of bean plants was studied by measurement of growth responses. In the absence of other cations, the rate of absorption was dependent upon the hydrogen-ion concentration, in accord with the findings of earlier investigators. However, at neutral or alkaline pH values, the response was found to be influenced markedly by certain cations. Thus, ammonium and ethanolammonium ions, supplied either as salts of 2,4-D or as buffer cations, in alkaline solutions induced responses approaching those observed with acid solutions. On the other hand, sodium and potassium ions did not manifest this property. The cation effect was influenced to some extent also by certain anions and surfactants. [Authors' summary.]—Biol. Warfare Lab., Fort Detrick, Frederick, Md.

2452. Larson, R. E., and others.
Mechanical considerations.
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 173-81.

When 3 in. clay pots were soaked for 5 min. in 500 and 1,000 p.p.m. 2,4-D(ester and amine) and 2,4,5-T, dried for 1 hr. and filled with soil in which kidney beans were sown, all the seedlings were affected. After 4 weeks the pots were filled with fresh soil and tomatoes planted; only those in pots treated with 2,4,5-T and 2,4-D (amine) at 1,000 p.p.m. were affected. After a further month the pots were refilled and replanted with tomatoes; this time only 2,4,5-T was active. Autoclaving the pots did not inactivate the herbicides.—From *Weed Abstr.*, 7, No. 466.

2453. Morgan, M. J., Rasmussen, L. W., and Orton, L. W.
The effect of wind on delivery patterns of nozzles used for weed spraying.
Weeds, N. York, 1957, **5**: 350-61, bibl. 9, illus.

Investigations into the difficulties and dangers of low volume spraying were made by using a wind tunnel to determine the alteration of spray patterns of fan-type nozzles and the amount of drift down wind caused by different wind strengths.—From *Weed Abstr.*, 7, No. 598.

Control of aquatic weeds.

(*See also* 2511e, j, k.)

2454. Chancellor, A. P.
The control of aquatic weeds and algae.
[*Publ.*] *Minist. Agric. Lond.*, 1958, pp. 20, bibl. 16, 2s. 6d.

For purpose of their control aquatic plants are divided into emergent species, submerged species and algae. After dealing with biological, mechanical and chemical methods of control, notes are given on the following chemicals commonly used against aquatic weeds: sodium arsenite, monuron, 2,4-D, MCPA, TCA, sodium chlorate and dalapon. Algae are considered separately; they are usually controlled by copper sulphate alone or with lime, chlorine and allied compounds, sodium arsenite, rosine amine compounds and 2,3-dichloronaphthoquinone.

2455. Bondur, A. I.
Trials on the use of herbicides for controlling hardy vegetation in ponds of collective farms in the Kiev region. [Russian.]
Sb. naučn. Rabot Ukr. n.-i. St. Rybovodstva, 1956, No. 2, pp. 5-14, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97617.

From 1 to 2·5% concentrations of butyl ester and sodium salt of 2,4-D were used with success for the control of reeds [*Phragmites* sp.], cattail [*Typha* sp.], pondweed [*Potamogeton* sp.] and sedge [*Carex* sp.]. A 7·5 mg./l. concentration of 2,4-D (ester) caused no harm to fish, and the treatments in general did not affect the development of zooplankton. Pond weeds should be treated before flowering, on warm, windless days when rain is not expected.

Control of particular species.

2456. Singh, B.
Control of *bandha* (*Dendrophthoe falcata* (L.f.) Ettings.) from some horticultural and other economic plants.
Hort. Advance, 1957, **1**: 68-78, bibl. 11, illus.

Of a number of chemical and hormone sprays tried, diesel oil 40% emulsion spray, given during summer on bright days, killed the parasite without damage to the hosts which, in these experiments, were mostly tropical fruit trees.—B.R. Coll., Agra.

2457. Seth, J. N.
Comparative effect of certain herbicides on *bandha* and its hosts.
Sci. and Cult., 1958, **23**: 424-6, bibl. 7.
Control of *Dendrophthoe falcata* (L.f.) Ettings., by injections of certain chemicals and hormones.
Hort. Advance, 1957, **1**: 79-85, bibl. 5, illus.

Chemical and hormone sprays applied to *Dendrophthoe falcata*, parasitic on certain tropical fruit trees, did not effectively control the parasite without damage to the hosts. No general recommendation can be made.—Hort. Res. Stat., Saharanpur.

2458. Marinos, N. G.
Maleic hydrazide in the control of the bulbous weed *Oxalis pes-caprae*.
Nature, 1958, **181**: 1143, bibl. 8.

Maleic hydrazide at 0·15 or 1·5%, sprayed on 5 May or 7 June, considerably reduced the number of bulbs produced by *Oxalis pes-caprae*. The greatest reduction in sprouting the following season was achieved by spraying with 1·5% maleic hydrazide during or after June.—Waite agric. Res. Inst., Adelaide.

2459. Bougard, M.
La lutte contre le fougère-aigle (*Pteris aquilina*). **(The control of bracken (*Pteridium aquilinum*.)**
Bull. Soc. roy. For. Belg., 1957, **64**(5): 237-40.

A growth regulating herbicide, ST 412, is said to give 80% control of bracken if applied in 1,000 l./ha. of water to wet both sides of the fronds. Treatment should be made when the fronds have completed their growth.—*Weed Abstr.*, **7**, No. 749.

2460. Sax, K.
Paste the poison ivy.
Arnoldia, 1956, **16**: 5-8, illus. [received 1958].

Large poison ivy vines can be killed, without injuring their host trees, by removing strips of bark near the base and applying to the wounds a brush killer paste consisting of 1 part of a mixture of 2,4-D (35%) and 2,4,5-T (33%) in 9 parts of a greasy carrier (e.g. lanolin, wax or lubricating grease). Many other woody species can be destroyed in the same way.—Arnold Arbor., Harvard Univ.

Control of weeds in fruit crops.

(*See also* 2511h.)

2461. Hemphill, D. D., and others.
[Weed control in] fruits.
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 152-4.

Apples: An area 6×6 ft. round 2-year-old apple trees was dug, covered with a light mulch and sprayed. (1-Chloropropyl-2) N-(3-chlorophenul) carbamate at 14 lb./ac., simazin 4 lb./ac. and tris(2,4-dichlorophenoxyethyl)phosphite 4 lb./ac. gave season-long weed control without injuring the trees. *Cranberries:* Of several materials tested for the control of *Onoclea sensibilis*, iron sulphate at 900 lb./ac. was the most selective. *Grapes:* The standard treatment of oil fortified with dinitro was the best, while some other materials showed promise. *Strawberries:* Low rates of 2,4-DES (about 1 lb./ac.) caused no injury.—From *Weed Abstr.*, **7**, No. 397.

2462. Whitf, R. G., and others.
[Weed control in] fruits.
Res. Rep. east. Sect. nat. Weed Cttee Canada, 1957, pp. 56-9.

Cranberry: Amino triazole at 2–12 lb./ac. in 300 gal. gave very good weed control and no crop injury when applied in August. In upland cranberries spraying on June 28 just before flowering, with 1 lb./ac. of either 2,4-D or 2,4,5-T, resulted in injury, and other materials were also either injurious or ineffective against the weeds. Varsol at 200 gal./ac. effectively controlled grasses but not broad leaved weeds. *Peach, apple and pear:* Amino triazole at 25 lb./ac. controlled established and germinating crabgrass without injuring 2-year-old Envoy peach trees under which it was growing. Two-year-old McIntosh apple, Elberta peach and Maxine Beauty pear trees were injured by May applications of Dowpon [dalapon] at 13 lb./ac.; older pear trees were unaffected. *Strawberry:* In an experiment with 6 herbicides Vapam at 100 gal./ac. and Mylon at 75–300 lb./ac. applied 3 weeks before planting gave good weed control but caused some temporary crop injury; Neburon at 2 and 4 lb./ac. and EPTC at 4–8 lb./ac. were harmless.—From *Weed Abstr.*, **7**, No. 509.

2463. Hemphill, D. D., and others.
[Weed control in] fruits.
Res. Rep. 14th N. centr. Weed Control Conf. 1957, pp. 141-2.

Strawberries. Simazin 1 lb./ac. is reported as being harmless; simazin 2 lb./ac., G-27901 (2-chloro-4-ethylamino-6-diethylamino-s-triazine) 2 lb./ac. and G-30028 (2-chloro-4,6-bis(isopropylamino)-s-triazine) 2 lb./ac. produced severe injury. The effect of a number of other compounds under conditions of extreme drought is recorded. *Apples.* 2,3,6-TBA 3 lb./100 gal. applied to weed growth below apple trees resulted in considerable injury.—*Weed Abstr.*, **7**, No. 681.

2464. Jaivenois, A.
Essai de désherbage chimique en culture fruitière. **(Chemical weed control trials in fruit growing.)**
Fruit belge, 1958, **26**: 33-6.

CMU at 2·5–5 kg. per ha. has given good control of seedlings and dormant perennial weeds in apple and pear orchards; rates of 5 kg. per ha. were injurious to young trees. Dalapon at 10 kg. per ha. was unsatisfactory for controlling couch grass, and was harmful to young growing trees. Weed control with DNOC at 50 l. per ha. was excellent even in a period of rainy weather.

2465. van Oorschot, J. L. P., van Staalduine, D., and van der Zweep, W.
De chemische bestrijding van kweekgras in de fruitteelt. **(Chemical control of couch grass in fruit-growing.)**
Fruitteelt, 1958, **48**: 303-6, bibl. 14.

The use of dalapon and TCA for couch grass control and their effects on growth of fruit plants are discussed. Dalapon at 5 and 10 kg. per ha. gave short-term control of couch grass in apples and blueberries, but better control was obtained with a second application of amino-triazol (2 kg. per ha.). A survey of growers' trials showed that TCA was frequently injurious to apples. Cox appeared to be susceptible to dalapon, particularly young trees on M.IX, but rates up to 10 kg. per hectare are recommended.

2466. Evans, W. P.
MCPB can keep black currants clean.
Grower, 1958, **49**: 747.

Applications of MCPB to blackcurrant bushes while still growing were phytotoxic. An MCPB formulation sprayed at 5–6 pints per acre after bush growth had stopped gave good control of perennial weeds, with only negligible damage to the bushes. Applications have been given to several varieties, and no tainting of the fruit has been apparent.—May and Baker, Ltd.

2467. Soyez, J. L., and Faillet, P.
Le désherbage chimique des vignes. **(Chemical weed control in vineyards.)**
Phytoma, 1958, **95**: 20-30, illus.

In trials in 1957 in different varieties of vine of varying ages no injury was caused by monuron 3·20–6·40 kg./ha., dalapon 8·50 kg./ha., monuron 4·80+dalapon 4·25 kg./ha. or diuron 3·20 kg./ha. Dalapon, both alone and in the mixture, was effective against *Agropyron repens* and monuron at all rates gave good results. In further trials with higher rates or when irrigation followed treatment some injury was caused by monuron and diuron. Monuron at 3·2–4·8 kg./ha. is used only on vines at least 5-years-old while for younger plants diuron is preferred. Recent trials indicated that vines up to 3-years-old can safely be treated with diuron at 1·6 kg./ha. The herbicides should be applied in 300–600 l. water after cultivation from April to June. Results of various trials with all 3 materials are illustrated in colour. It was further found that peach trees were unharmed by dalapon 20·4 kg./ha., and that under Stayman Red apples dalapon 8·5 kg./ha. gave 95% control of *Baldingera arundinacea* and *Cynodon dactylon.*—From *Weed Abstr.*, 7, No. 689.

Control of weeds in ornamentals.

(*See also* 2905.)

2468. WARREN, G. C., AND OTHERS.
[Weed control in] ornamentals.
Res. Rep. east. Sect. nat. Weed Cttee, Canada, 1957, pp. 60-3.

Results are given of weed control in coniferous seedlings. In most cases treatments which were effective against the weeds injured the conifers. When Sesone [2,4-DES] at 5 lb./ac. was applied to alyssum, aster, *Ageratum*, *Celosia*, coleus, French marigold, Jacob's coat, *Lobelia*, nasturtium, pansy, petunia, phlox, *Salvia*, snapdragon, and zinnia only *Ageratum* and pansy were injured. Alanap 20G [NPA] at 4 and 6 lb./ac. injured *Lobelia*, *Neirenbergia*, petunia, snapdragon and 10-week stock, but not marigold; 2,4-DES at 3 and 6 lb./ac. caused no injury to any.—From *Weed Abstr.*, 7, No. 508.

2469. MAHLSTEDE, J. P., AND OTHERS.
[Weed control in] ornamental nurseries, forest nurseries, shelterbelts, and all others.
Res. Rep. 14th N. centr. Weed Control Conf. 1957, pp. 143-8.

The following quantities of amino triazole were tolerated by coniferous seedlings 45 days after emergence: black spruce 2 lb./ac., white spruce 2–3 lb./ac., red pine 1 lb./ac., Scotch pine <1 lb./ac., Jack pine 2 lb./ac., white pine <1 lb./ac., balsam 2–3 lb./ac., white cedar 1 lb./ac., 2–3-year-old white and black spruce sprayed in August tolerated amino triazole 2 lb./ac., red pine of the same age tolerated 1 lb./ac., 2 lb./ac. caused some chlorosis. Seedling *Pseudotsuga menziesii* and *Pinus contorta* were found to be much more tolerant of MH, dalapon and neburon than 2,4-D or 2,4,5-T. *Rhamnus cathartica* treated with simazin 4 lb./ac. immediately after transplanting and given plentiful watering was defoliated; CDAA 5 lb./ac. similarly applied caused no injury. Rooted cuttings of *Taxus media* were unaffected by 2,4-DES 3 lb./ac. (4 applications), monuron 4 lb./ac., simazin 4 lb./ac., neburon 4 lb./ac. (2 applications). 3-year-old sugar maple tolerated simazin 8 lb./ac. The growth of chickweed (*Stellaria media*) and some other weeds was reduced by MH. Hollyhocks (5-leaf stage) and daisy and anemone transplants showed little or no injury from 2,4-DES 4 lb./ac., NPA (20 G) 5 lb./ac., dinoseb, CDAA (granular) 2 lb./ac.; simazin 2 lb./ac. only affected hollyhocks.—*Weed Abstr.*, 7, No. 673.

2470. BIRDSELL, D. G., WATSON, D. P., AND GRIGSBY, B. H.
Toxicity and efficiency of selected herbicides on representative ornamental plants.
Weeds, N. York, 1958, 6: 34-41, bibl. 35, illus.

In nursery plantings 2-year-old *Juniperus chinensis pfitzeriana*, *Taxus cuspidata*, *Lonicera tatarica* and 1-year-old *Ligustrum amurense*, *Spiraea bumaldi*, *Vinca minor* and *Hedera helix baltica* were sprayed with 5 herbicides in mid-July, i.e. 1–2 months after planting. 2,4-D (amide) at 2 lb./ac. caused epinasty in all plants and slight chlorosis in juniper and yew. 2-chloro-4,6-bis(diethylamino-s-triazine (CDT) at 8 lb./ac. caused chlorosis in yew, privet and ivy. From injury caused by both herbicides all the plants except ivy recovered within 3 months. Neburon at 2 lb./ac. caused slight chlorosis to ivy and yew. 2,3,6-TBA damaged the growing tips of all plants and caused epinasty and chlorosis in leaves of some. Erbon at 80 lb./ac. had the most severe toxic effects. The best overall weed control was also obtained with erbon, followed by 2,4-D(amide), CDT, neburon and 2,3,6-TBA. The herbicides, with the exception of erbon, were much more effective against broad-leaved weeds than against grasses.—From *Weed Abstr.*, 7, No. 671.

2471. CHAPPELL, W. E.
Weed control in nursery planting.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, p. 229.

Herbicides formulated on a granular carrier were applied for control of germinating weeds to beds of azaleas, apple grafts, and various cuttings. In azalea beds CIPC at 8 lb. and dinoseb at 9 lb. per acre controlled weeds for several weeks. Other materials which controlled weeds without affecting the azaleas were sodium pentachlorophenate, diuron and vegedex. [See also *H.A.*, 28: 1341.] Three applications at 3-week intervals controlled weeds for about 6 months. Dinoseb at 9 lb. and EPTC at 7·5 lb. per acre gave almost complete weed control in apple grafts, 2-year-old holly, privet and forsythia cuttings without causing injury to the plants. Diuron at 1·5 lb. per acre resulted in some chlorosis.

2472. BERATUNGSSTELLE FÜR GARTENBAU U. LANDWIRTSCHAFT, BERLIN.
Unkrautbekämpfung mit chemischen Mitteln. **(Chemical weed control.)**
Gartenwelt, 1958, **58**: 116-17, bibl. 1.

Weed control in gladioli was successful with pre-emergence applications of Prevenol 56 and Nexoval, or post-emergence applications of BNP 30. Good control among November-planted tulips was obtained with Prevenol 56 applied soon after planting, and with BNP 30 applied in mid-February. Slight toxicity was apparent with the BNP 30 sprays. Prevenol 56 was best for weed control in freesias, but BNP 30 and Granulat a were also effective. Complete weed control in glasshouse roses was given by BNP 30 or Granulat a plus sodium nitrate.

2473. (PRIDHAN, A. M. S.)
Effects of CIPC on weed growth.
Flor. Exch., 1958, **130**(12): 73.

Weeds among mature chrysanthemums were reduced by granular CIPC at 12–16 lb. per acre without affecting chrysanthemums. In newly planted roses granular CIPC at 16 lb. per acre did not affect rose growth and completely controlled redtop grass.—Cornell Univ., Ithaca.

Control of weeds in tobacco.

2474. Chappell, W. E., LaPrade, J. L., and McClaugherty, F.
Weed control in tobacco seed beds.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, p. 120.

Three compounds which, applied as drenches, have shown promise in weed control are: allyl alcohol plus ethylene dibromide, allyl alcohol plus diethylene dibromide and vapam. All may be applied in the autumn or up to 3 weeks before sowing. [See also *H.A.*, 28: 1347.]

2475. Mahlstede, J. P., and others.
[Weed control in] ornamental nurseries, forest nurseries, shelterbelts, and all others.
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 155-8.

Autumn and spring applications of 6 materials were compared for weed control in tobacco seedbeds. Methyl bromide in the spring gave the best results and Vapam, applied either in the autumn or spring, was nearly as good. In hollyhocks pre-emergence application of NPA at 5 lb./ac. showed promise.—From *Weed Abstr.*, 7, No. 398.

2476. Zagorovskij, A. V.
Developing methods for controlling Egyptian broomrape on irrigated tobacco. [Russian.]
Nauč. Tr. Frunzensk. zonal. opyt.-selekc. St. Vses. n.-i. In-ta Tabaka i Mahorki, 1956, No. 1, pp. 66-93, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,604.

The host range of Egyptian broomrape in some Central Asian republics is discussed. It was found that the rate of broomrape infestation of tobacco is affected by soil temperature, rates and dates of irrigation and nutrition. Early planting reduced crop damage and increased yields by 50%. Autumn-winter irrigation, reduction of intervals between irrigations and increased manuring also reduced injury.

Control of weeds in tropical crops.

2477. Younge, O. R.
Weed control in field and orchard crops.
Hawaii Fm Sci., 1958, **6**(3): 6-7, illus.

In a short note on weed control under established perennial crops it is stated that dalapon at 10–20 lb. in 50–100 gal. water/acre has proved particularly effective against grass weeds, and at 20–30 lb./acre it has also controlled nutgrass. Where broad-leaved weeds are also present these can be destroyed by adding 2–4 lb. PCP to the dalapon spray. Under local conditions 1 to 3 spray applications per annum have given adequate control of weeds without apparent injury to papaws, macadamias, coffee, bananas, guavas, litchis, passion fruit and hibiscus.

2478. Vayssière, P.
Les mauvaises herbes en Indo-Malaisie. **(Weeds in Indo-Malaya.)**
J. Agric. trop. Bot. appl., 1957, **4**: 392-401, bibl. 6, illus.

Eupatorium odoratum has in some instances suppressed *Imperata cylindrica*, but has become a problem in rubber plantations and near tobacco, where it is a host of the pests *Myzus persicae* and *Bemisia tabaci*. The fern *Gleichenia linearis* is widespread in rubber and oil palm plantations. *Imperata* seriously affects crops of tea, coffee, *Ficus*, coconut, cinchona, etc. It is most effectively eradicated from virgin soil by bulldozing followed by harrowing. An alternative involves 6-fold tillage with a rotary hoe, followed by planting a pioneer crop of legumes (e.g. *Pueraria*). *Gleichenia* is controlled by uprooting or, where the climate is not too wet, by burning. *Gleichenia* is eradicated and *Imperata* temporarily controlled by 7 weekly sprays of sodium arsenite at 500 g. in 18 l. of water per ha. with a wetting agent. *Imperata* has been controlled in rubber by a single application of sodium TCA at 375 kg. per ha. as 4–15% aqueous solution, or by 4 applications of the same compound at 15% mixed with 1% Pernoxone (sodium 2,4-D) and a wetting agent, using 400 kg. of mixture per ha. Good results were also given by 4 applications of 30% diesel oil emulsion with the addition of 12 kg. per ha. of PCP. In various places *Imperata* has been suppressed by planting *Vitex pubescens*, *Albizzia moluccana*, *Centrosema pubescens* and other shade and cover crops. Burning generally encourages this weed, but it has been checked in Indo-China by sowing *Mimosa invisa* among it shortly before burning and allowing the legume to seed annually before repeated burnings. Further investigation is necessary on various insects which damage *Imperata*, but possibly *Orseoliella javanica* may prove a means of control.

2479. Ivens, G. W.
A note on the use of dalapon to control couch-grass in coffee.
Pestic. Abstr. News Summ., Sect. C, 1958, **4**: 80-1.

Dalapon appears to be the most effective of the herbicides tested in East Africa against couch grass (*Digitaria* spp.). In trials in Kenya it was used in coffee at rates up to 5 lb./ac. without damaging the crop but, in at least one trial in Tanganyika, symptoms of damage became evident 4 months after treatment with 5 lb./ac., while 10 and 20 lb./ac. caused severe injury. Precautions in using the herbicide are suggested.

2480. Constable, D. H.
Weedkilling in hevea.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **33**: 57-62.

Among several selective and non-selective herbicides tested the following gave effective weed control: Dowpon (dalapon) at 10–15 lb. per 40 gal. per acre; Dipentox (PCP/2,4-D) at 4 gal. active material per 40 gal. per acre; and an Amizole/PCP mixture as 2–4 lb. Weedazol plus 3 gal. Shell P12 at 40 gal. per acre. Strip spraying along each side of the planting line is recommended, using a portable boom sprayer.

2481. Surre, C.
La mécanisation dans l'entretien des palmeraies. Le "Rouleau La Mé". **(Mechanisation in the maintenance of plantations of palms. The La Mé weed cutter.)**
Oléagineux, 1958, **13**: 467-9, illus.

This weed cutter consists of 3 logs, 1 m. long and 0·5 m. in diameter, independently mounted and each equipped with 6 radial cutting blades running the length of the roller. The whole may be pulled by a 40 h.p. tractor. The economics of the implement are discussed.

2482. MATHUR, P. S.
On the occurrence of weeds in sugarcane fields as influenced by continuous application of fertilizers to soil.
Indian J. Sugarcane Res., 1958, **2**: 76-87, bibl. 17.

Changes in the weed flora in plots which had received the same fertilizer treatments for 16 years are recorded. The 27 fertilizer treatments were 3 levels each (0, 1 and 2) of ammonium sulphate, superphosphate and potassium sulphate in all possible combinations. No marked differences due to P or K were observed. The minus-N treatments favoured leguminous weeds, particularly *Desmodium triflorum* and *Alysicarpus vaginalis*, and *Striga euphrasioides*. Nitrogenous applications favoured *Chenopodium album*, *Commelina benghalensis*, *Polygonum plebejum* and *Physalis minima*. In fields under cane there were more weed species in the minus-N plots than in the N_1 and N_2 plots, but no such difference was observed in fallow fields. Full lists of weeds for different ecological situations are given.—Main Sugarcane Res. Stat., Shahjahanpur, U.P.

2483. FERRARIS, I. P., AND LACSON, M. V.
Chemical weed control—a review of the pre- and post-emergence applications of different weedicides.
Sugar News, 1958, **34**: 119-23, bibl. 8.

Of 5 herbicides tested in sugar cane, 2,4-D applied at 4 lb. in 100–125 gal./ha. as a pre-emergence spray gave effective weed control for 1½–2 months. As a post-emergence treatment 2,4-D was effective only if the predominant weed was an *Ipomoea* sp. A mixture of 12 kg. TCA+1 kg. 2,4-D per ha. also gave effective control but, to avoid damage to the cane, had to be applied between the rows only. CMU was effective in pre-emergence control but expensive.

Control of weeds in turf.

(*See also* 2511i, 2908.)

2484. MADISON, J. H., JR.
Turf invasion by weedy grasses.
Calif. Agric., 1958, **12**(4): 11.

Crabgrass and common bermuda grass were sown in clean plots of Merion bluegrass. Crabgrass was almost eliminated when grass was cut to 2 in. In July crabgrass counts were significantly higher in plots with the highest irrigation level, but later in the season no effect of irrigation was apparent. The relative area of bermuda grass increased with irrigation. In plots mowed at ½ in., bermuda grass formed a dense mat, while at 2 in. the mat was more open.—Univ. Calif., Davis.

2485. LEE, O. C., AND OTHERS.
[Weed control in] turf.
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 124-31.

The effects are reported of a large number of herbicides, including several arsenicals, on *Digitaria sanguinalis*, *Polygonum aviculare*, *Stellaria media*, *Trifolium repens*, and some other weeds in bluegrass turf.—From *Weed Abstr.*, 7, No. 393.

2486. LEE, O. C., AND OTHERS.
[Weed control in] turf.
Res. Rep. 14th N. centr. Weed Control Conf. 1957, pp. 114-17.

Reasonably good control of crabgrass (*Digitaria* spp.) was given by DSMA [disodium methyl arsonate] 4–6 lb./ac., trichloroisobutyric acid (TCB) 4 lb./ac., lead arsenate 550 lb./ac. and chlordane 75 lb./ac. Bluegrass was not appreciably affected by DSMA or TCB, and Bermuda grass tolerated DSMA. Ammonium nitrate ca. 200 lb./ac. gave good results but caused serious initial scorch to Bermuda grass. Chickweed (*Stellaria media*) was eradicated by neburon 2·1 lb./ac. in 25–200 gal./ac. without injury to bluegrass. Strawberries and raspberries were uninjured by neburon 2 lb./ac.—From *Weed Abstr.*, **7**, No. 670.

2487. ANDERSON, B. R., AND MCLANE, S. R.
Control of annual bluegrass and crabgrass in turf with fluorophenoxyacetic acid.
Weeds, N. York, 1958, **6**: 52-8, bibl. 6, illus.

A number of fluorophenoxyacetic acids applied at 1 lb./ac. reduced seed yields of millet by 80–100%. Treatment with 4-fluorophenoxyacetic acid at 0·5 lb./ac. caused stunting and sterility in annual bluegrass (*Poa annua*); crabgrass (*Digitaria sanguinalis*) was severely checked and produced sterile heads. At 1 lb./ac. it did not affect the vegetative growth of the basic turf grasses, Kentucky bluegrass and bentgrass.—From *Weed Abstr.*, 7, No. 733.

2488. GALLAGHER, J. E.
Chemical weed control in turf.
Golf Course Reptr, 1957, **25**(5): 1-7.

The phenyl mercuric salt of 2,4-D at 1 lb./ac. in 40–200 gal. water when soil moisture is adequate has been successfully used as an early post-emergence treatment to control silver crabgrass [*Eleusine indica*]. The chemical control of broadleaf and annual grass weeds, clover and other crabgrasses in turf, pre-sowing treatments and methods of removal of 2,4-D from sprayers are discussed.—*Weed Abstr.*, **7**, No. 583.

Control of weeds in vegetables.

(*See also* 2090, 2703, 2704.)

2489. JASMIN, J. J., AND OTHERS.
[Weed control in] horticultural crops. (a) Vegetables.
Res. Rep. east. Sect. nat. Weed Cttee Canada, 1957, pp. 37-55.

Information is given on weed control with a large number of herbicides in asparagus, beans, beets, carrots, celery, onions, peas and some other crops. In an experiment on seedbed treatment with Mylone, onion, cabbage, tomato and celery were sown 9 days after applying the material at 100–300 lb./ac. Very good weed control was obtained in all plots and only cabbage showed temporary injury at the highest rate. —From *Weed Abstr.*, 7, No. 504.

2490. Chappell, W. E., and Massey, P. H., Jr.
Weed control in vegetable crops.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 225-6.

Herbicides impregnated on vermiculite as a carrier and applied with dusters or rotary seeders immediately after transplanting tomatoes, broccoli, capsicums and cabbage controlled weeds for 3–6 weeks. Dinoseb at 6–7·5 lb. and CIPC at 4 lb. per acre were the most effective.

2491. Ries, S. K., and others.
[Weed control in] other vegetables.
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 145-51.

The reaction to pre- and/or post-emergence applications of a large number of herbicides is noted for the following crop plants: snap, lima and bush beans, cucumber, celery, tomato, turnip greens, kale and spinach.—From *Weed Abstr.*, 7, No. 389.

2492. Warren, G. F., and others.
[Weed control in] other vegetables.
Res. Rep. 14th N. centr. Weed Control Conf. 1957, pp. 132-40.

A description is given of the effects of a large number of herbicides used for weed control in lima and snap beans, celery, tomato, cucumber, asparagus and peppermint. It was noted that a pre-emergence application of dinoseb 9 lb./ac.+CIPC 6 lb./ac. to peppermint increased yields of oil.—From *Weed Abstr.*, 7, No. 666.

2493. Noll, C. J.
Herbicides effective for weed control in asparagus.
Science for the Farmer, 1957, **5**(2): 12, illus.

Monuron applications are recommended at 2 lbs. per acre after spring cultivation, and again following cultivation at the end of the cutting season, if weeds have developed.

2494. van Staalduine, D., and van Oorschot, J. L. P.
Chemische onkruidbestrijding in de aspergeteelt. (**Chemical weed control in asparagus beds.**) [English summary 12 lines.]
Meded. Dir. Tuinb., 1958, **21**: 83-9, bibl. 21.

American experience in chemical weed control in asparagus is reviewed, and some Dutch results are given. The best results in bearing fields have been obtained with PCP-oil applications at 40 l. per ha., and its use is officially approved during the growing season. CMU at 0·8 kg. per ha. has given satisfactory weed control in post-harvest applications.

2495. Hirst, R. H., and Martin, D. L.
Weedkilling in brassicas.
Comm. Gr, 1958, No. 3252, p. 1035, illus.

Sodium monochloroacetate has given satisfactory weed control when applied to cabbages in the seedbed and 7–10 days after transplanting. Spray applications in onions and leeks are recommended in the post-crook stage and up to the 3rd true leaf.—Plant Protection Ltd., Fernhurst.

2496. Couto, F. A. A.
Observações preliminares sôbre o emprêgo de Alanap-1 como herbicida seletivo para cucurbitácea. (**Preliminary observations on the use of Alanap-1 as a selective herbicide for cucurbits.**) [English summary ⅓ p.]
Rev. Ceres, 1957, **10**: 176-80, bibl. 4.

Alanap-1 (N-1 naphthyl phthalamic acid) was sprayed at 2·25, 4·5 and 6·75 kg. per ha. in water [concentration not stated] 2 days after sowing cucumber seeds. Nutgrass (*Cyperus rotundus*) and *Oxalis violacea* were resistant, but the heaviest application gave good control of grasses, *Portulaca oleracea*, *Amaranthus* sp., *Hyptis suaveolens* and *Galinsoga parviflora*.

2497. Ries, S. K.
Chemical and cultural methods of controlling weeds in pickling cucumbers.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 503-14, bibl. 11, illus.

Annual weeds in pickling cucumbers were effectively controlled by pre-emergence applications of NPA or CDEC. Dalapon at 10 lb. per acre gave adequate control of vigorously-growing *Agropyron repens*, when applied 5 weeks before planting. [See also *H.A.*, 28: 383.] Deep cultivation (4–6 in.) resulted in reduction in yields, and shallow cultivation is recommended.

2498. Detroux, L., de Faestraets, L., and Lavalleye, M.
Le désherbage chimique des cultures de haricots. II. Essai du néburon et du simazin. (**Chemical weed control in bean crops. II. Tests with neburon and simazin.**)
Parasitica, 1958, **14**: 1-9, bibl. 3.

Pre-emergence application of neburon at 1–2 kg. active ingredient per acre gave satisfactory weed control in U.S. Refugee no. 5, without causing growth depression. Bean yields were significantly reduced by simazin at 1 kg. active ingredient per acre.—Stat. Phytopharm. État, Gembloux, and INACOL, Wesembeek-Ophem.

2499. Burgis, D. S.
Chemical weed control in pole beans and tomatoes.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 111-13, bibl. 2.

Runner bean plots treated with simazin or EPTC (ethyl N,N-di-n-propylthiol carbamate) had significantly fewer weeds than untreated plots. Bean yields were reduced by simazin at 1½ lb. per acre, but yields on EPTC-treated plots were higher than on control plots. In staked tomatoes post-emergence applications of EPTC, simazin, Karmex DW or Herbisan show promise for weed control.—Gulf Coast Exp. Stat., Bradenton.

2500. Sexsmith, J. J., and others.
[Weed control in] field and canning peas.
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 132-7.

As pre-emergence applications the following have all given good results: 2-chloro 4,6-bis(diethylamino)-s-triazine at 4–9 lb./ac., dinoseb 8 lb./ac., CIPC 4–9 lb./

ac., dalapon 2–4 lb./ac., TCA 6 lb./ac., CDAA 4–6 lb./ac., diuron 2 lb./ac., CDEC 4 lb./ac., neburon 2–4 lb./ac., monuron 2 lb./ac., dinoseb 3 lb./ac.+CDAA 2 lb./ac., 2,4-DEB 4 lb./ac., KCN in one trial gave a 50% increase in yield, far more than any other compound. Amino triazole 3 lb./ac., and in one experiment dalapon 4 lb./ac., were highly injurious. For post-emergence MCPA (various salts) 4–6 oz./ac., dinoseb 1–4 lb./ac. and approximately 1 : 1 mixtures of dalapon with dinoseb or MCPB have given good to excellent results. Diuron 1–2 lb./ac.+dalapon, MCPB or dinoseb 0·5–1 lb./ac. tended to reduce yields.—*Weed Abstr.*, 7, No. 382.

2501. Sexsmith, J. J., and others.
[Weed control in] field and canning peas.
Res. Rep. 14th N. centr. Weed Control Conf., 1957, pp. 118-24.

For pre-emergence weed control in peas 17 herbicides, at given rates, have shown promise; simazin at 2 lb./ac. was lethal and tris (2, 4-dichlorophenoxyethyl) phosphite at 6 lb./ac. was injurious. In post-emergence trials all the 6 materials used caused injury.—From *Weed Abstr.*, **7**, No. 664.

2502. Krüger, H.
Untersuchungen über Anwendung und Wirkung verschiedener Herbicide (2,4-D, MCP, DNC, DNBP, IPC und Kalkstickstoff) zur Unkrautbekämpfung in Erbsen und Lein. **(Studies on the application and effect of various herbicides (2,4-D, MCP, DNC, DNBP, IPC and calcium cyanamide) used for weed control in peas and flax.)** [Russian, English and French summaries ½ p. each.]
Kühn-Arch., 1958, **71**: 384-450, bibl. 65, illus.

Pea yields after pre-emergence applications of herbicides were reduced in comparison with those on control plots. Highest yields with post-emergence treatments were obtained by 5 l. DNBP per ha. applied when peas were 6–10 cm. high. 2,4-D and MCP applications resulted in delayed flowering and reduced yields to 87·6%; pod number per plant and seed number per pod were also reduced, but individual seed weight was increased. Applications of calcium cyanamide to peas 5 cm. high were not injurious.—Inst. Acker-u. Pflanzenb., Wittenberg.

2503. Zoschke, M.
Studien über die Wirkung synthetischer Wuchsstoff-Herbicide auf Kulturpflanzen und Unkrautflora. **(The effect of synthetic growth regulator herbicides on crops and weeds.)** [Russian, English and French summaries ½ p. each.]
Kühn-Arch., 1957, **71**: 305-83, bibl. 92, illus.

Weed control in peas was more successful with a proprietary MCP material than with a DNC-based material. Pea composition varied in the 2 seasons of the experiment, but crude protein contents were higher in both years on herbicide-treated than on untreated plots.—Inst. Acker- u. Pflanzenb., Wittenberg.

2504. Poignant, P., Chaffard, M., and Thellot, B.
Le monochloroacétate de soude: nouveau désherbant selectif des oignons et poireaux. **(Sodium monochloroacetate: a new selective herbicide for onions and leeks.)**
Phytoma, 1958, **95**: 13-19, bibl. 2, illus.

In trials in 1953 sodium monochloroacetate (MCA) at 15 kg./ha. and dinoseb (ammonium) at 9 kg./ha., both applied in 1,000 l. when the stage of weed growth ranged from pre-emergence to 1–2 leaf, gave 76 and 74% overall control respectively. The susceptibility of 24 common weeds to 20 kg./ha. MCA is listed. The results are described of 4 trials with MCA applied at 15–30 kg./ha. in onions and leeks at growth stages ranging from emergence to 25 days post-emergence. The only crop injury recorded was a slight yellowing and temporary growth check to onions from 30 kg./ha. applied at emergence and slight temporary burning of onions from 25 and 30 kg./ha. applied 1 month after sowing.—From *Weed Abstr.*, 7, No. 762.

2505. Nylund, R. E., and others.
[Weed control in] onions, potatoes and root crops.
Res. Rep. 14th N. centr. Weed Control Conf. 1957, pp. 125-31.

Herbicides which showed good, promising or harmful effects in red beets, carrots and onions are listed. Simazin applied pre-emergence at 2 lb./ac. has shown promise in beets, carrots and onions but beans, peas, radish, lettuce, cucumbers and tomatoes were injured. Most of these crops were little affected by pre-planting treatment with Vapam at 5 lb./ac. or pre-emergence treatment with EPTC at 5 lb./ac.—From *Weed Abstr.*, **7**, No. 665.

2506. Alban, E. K., and others.
[Weed control in] vegetable "root crops".
Res. Rep. 13th N. centr. Weed Control Conf., 1956, pp. 138-44.

Onions: In one trial in which onions were treated pre-emergence at the 1 leaf and 4–5 leaf stages, monuron at 1·6 lb./ac., CIPC at 8 lb./ac. and monuron 0·8+CIPC 4 lb./ac. did not significantly reduce yields below that of the hand weeded control. Results of several other trials are given showing the crop reaction to a large number of herbicides. *Carrots:* Yields were unaffected by pre-emergence applications, at given rates, of CDT, 2,3,5-TB, CIPC, 3Y9, DCU, monuron, neburon and oil+CIPC or +CTD; CDAA and CDEC were injurious. *Beets:* Successful pre-emergence applications were made, at given rates, of the following: CDEC, TCA, endothal, dalapon, DCU±either CDAA, 3Y9 or diuron, and TCA+either CDAA, 3Y9 or diuron; CDT was harmful and conflicting results were obtained with neburon, 3Y9 and CDAA.—From *Weed Abstr.*, 7, No. 381.

2507. Meeklah, F. A.
Weed control in carrots.
N.Z. J. Agric., 1958, **96**: 293.

Of the residual pre-emergence herbicides tested, CIPC at 6 to 8 lb./acre gave the best results but a slight taint could be detected in the carrot. Of the contact herbicides, oktone with kerosene gave complete control of weeds already emerged. Kerosene alone at 30 gal./

acre, properly applied, gives satisfactory results; crop damage and taint are less likely if white spirit is used in place of kerosene.

2508. SEVAST'JANOVA, M. I.
Herbicides in vegetable growing. [Russian.]
Sad i Ogorod, 1958, No. 4, pp. 23-5.

Weed control in carrots with kerosene, CIPC and TCA and in onions with CIPC, TCA, calcium cyanamide and triethanolamine salt of dinitrophenol. Both crop and weed reactions to the herbicides and yield increases due to treatments are noted.

2509. SMIRNOV, B. M., AND GALEEV, N. A.
Weed control in carrots. [Russian.]
Sad i Ogorod, 1958, No. 4, pp. 25-7.

Tractor kerosene at 300–600 l./ha. is being used with success for weed control in carrots. In recent trials at the agricultural research institute of the South-East at Saratov it was found that by adding 1 kg./ha. of the wetter OP-7 the efficacy of the oil was increased and the amount required reduced. Carrots in the cotyledon stage were injured by kerosene, but showed great resistance in and after the first permanent leaf stage. Several examples of yield increments due to spraying with kerosene with or without OP-7 are given, and the cost of treatment is compared with that of mechanical and hand weeding.

2510. ZUEVA, N. P.
Control of annual grassy weeds. [Russian.]
Sad i Ogorod, 1958, No. 4, p. 28.

CIPC at 4 and 8 kg./ha. and TCA at 12 kg./ha. were applied in 500 l. before sowing carrots. CIPC especially at the higher rate gave good control of annual grasses (predominantly foxtail), increased yields and reduced production costs. TCA gave very good weed control but reduced carrot yields.

Noted.

2511.

a ANON.
Dalapon kills grass.
West. Fruit Gr, 1958, **12**(4): 27-8, illus.
Instructions for use in vineyards.

b ANON.
New killer aids banana growers.
Banana Bull., 1958, **21**(1): 12-13.
Dowpon (2,2-dichlorpropionic acid) at 15 lb./acre destroyed couch grass without harming bananas.

c BAGHDADI, H. A., MINESSY, F. A., AND HIGAZY, M. K.
Effect of agrosan and 2,4-D on germination, albinism and seedling growth in sweet lime and balady lime.
Alexandria J. agric. Res., 1956, **4**(2): 49-68, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 100,453.
Results from a 2-year experiment.

d BONILLA, J.
Uso de herbicidas en café. **(Use of herbicides in coffee.)**
Suelo Tico, 1958, **10**(38): 8-10.
Preparation and application of 2,4-D, dalapon, DNOSBP and TCA.

e COMMISSION FOR TECHNICAL CO-OPERATION IN AFRICA SOUTH OF THE SAHARA (C.C.T.A.).
Symposium of *Eichhornia crassipes* Leopoldville, 3-7 December, 1957. Report.
[*Mimeo.*] *Joint Secretariat*, 43 Parliament Street, London, 1957, pp. 8.
At present 2,4-D is the most effective and economical means of control.

f CRAFTS, A. S.
Comparative mobility of labelled herbicides in plants.
World Crops, 1958, **10**: 66, illus.
From studies using radioactive tracers.

g DAY, B. E., AND MCCARTY, C. D.
Chemical weed control in avocado culture.
Calif. Citrogr., 1958, **43**: 150, 174-8, bibl. 1, illus.
Oil sprays, 2,4-D and monuron [see also *H.A.*, 27: 1383 and 28: 362], and promising new materials.

h ELLENWOOD, C. W.
Amino triazole as a poison ivy control in orchards.
Ohio Fm Home Res., 1957, **42**: 46-7.
By spraying 5 lb. wettable powder in 100 gal. water. [See also *H.A.*, 27: 3407e.]

i GREENFIELD, I.
Moss control experiments at the Institute of Park Administration.
Park Administ., 1958, **22**: 513.
Using proprietary weedkillers, the composition of which is not stated.

j HARDCASTLE, W. S.
A rapid laboratory method of screening herbicides against aquatic plants.
Weeds, N. York, 1958, **6**: 64-5.
See *Weed Abstr.*, **7**, No. 717.

k HUDSON, M. S., AND HUDSON, B.
A laboratory test for screening chemicals for toxicity to submerged aquatic plants.
Weeds, N. York, 1957, **5**: 371-3, bibl. 2, illus.
See *Weed Abstr.*, **7**, No. 547.

l PORTERFIELD, J. G., AND ROTH, L. O.
Some machines and methods for removal and control of brush.
Bull. Okla. agric. Exp. Stat. **B-496**, 1957, pp. 22, bibl. 2, illus.
Wood shredders and chippers, saws, and spray equipment.

m TREVETT, M. F., AND MURPHY, H. J.
A guide for the use of chemical weed killers in 1958.
Misc. Publ. Me agric. Exp. Stat. **632**, 1958, pp. 23, illus.
Almost identical with last year's publication [see *H.A.*, 27: 2347].

n WAIN, R. L.
Plant growth and man-made molecules.
Proc. roy. Instn G.B., 1957, **36** (Part 2): 488-512, illus.
Theoretical reasons for selective activity, through *beta*-oxidation, of new herbicides such as MCPB.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 2129, 2131, 2134, 2145, 2146b, 2222, 2225, 2440, 2449g, 2451, 2452, 2489-2492, 2495, 2716d, g, l, 2717k, r, 2718j, l, 2841, 2946, 3202, 3226e.)

2512. Dodillet, H.-J.
Gemüsejungpflanzen unter künstlicher Beleuchtung. **(Young vegetable plants under artificial light.)**
Gartenwelt, 1958, **58**: 84-6, bibl. 5, illus.

Light source, light intensity and air temperature have been studied in relation to seedling growth of cucumbers, kohlrabi, tomatoes and lettuces. Fluorescent light gave the best results with all crops. Cucumber and kohlrabi were ready for planting out after 28 days and 35 days respectively at 4,000 Lux. The optimum air temperature during lighting was 26–27° C. for cucumber and 21–23° C. for kohlrabi; night temperatures were slightly lower. Cucumber picking started 12 to 13 days earlier in plants raised under artificial light. Costs of raising plants in the glasshouse and under artificial light in a cellar are calculated and compared, and show an advantage for artificial lighting. —Berlin-Dahlem.

2513. Lanckow, J.
Zusatzbelichtung im Treibgemüsebau mit dem neuentwickelten Praxisaggregat PA 57. **(Supplementary lighting in forced vegetable growing with a newly-developed lamp unit PA 57.)**
Dtsch. Gartenb., 1958, **5**: 59-61, illus.

Two types of lamp unit have been compared in raising young cucumber plants, one (PA 53) with a fixed reflector and the other (PA 57) with a hinged reflector. PA 53 was moved away from the plants during the day while the reflector of PA 57 was raised, although the unit remained over the plant. No economic or physiological differences between cucumber plants grown under each unit were observed. The advantages of PA 57 unit are that it does not need to be moved, costs less to construct, and is lighter in weight than PA 53.—Inst. Gartenb., Grossbeeren.

2514. Lauenstein, A.
Über die Direktaussaat von Gemüsearten für die Anzucht von Pflanzgemüse in Erdtöpfen. **(Direct sowing of vegetables for raising vegetable plants in soil pots.)**
Dtsch. Gartenb., 1958, **5**: 64-5, bibl. 3.

Average seedling weights of cabbage and cauliflower were higher with direct sowing in soil pots than after pricking out. The delay in growth of cauliflower and tomato plants resulting from pricking out was still apparent at harvest.—Inst. Landtech., Potsdam.

2515. Vogel, G.
Ergebnisse der Bodenheizung durch Dampf im Freiland hinsichtlich Ertragshöhe und Ertragsfrühzeitigkeit im Gemüsebau. **(Results of soil heating by steam in the open with regard to yield level and earliness in vegetable growing.)**
Dtsch. Gartenb., 1958, **5**: 34-7, bibl. 6, illus.

Drainage pipes for soil heating by low pressure steam were laid 0·25–0·35 m. below the soil surface, and 0·7–0·8 m. apart. Heating was applied for 10–20 min. when the soil temperature fell to 3–5° C. below the optimum for vegetable growth. Lettuce responded to soil heating by earlier maturity, but total yield and quality were not affected. Improved growth and fruit set were observed with cucumber. Yield and quality of cauliflower were improved, but little response to soil heating was observed with kohlrabi. Radish matured earlier and was of better quality. Soil heating improved vegetative and generative growth of capsicum. —Inst. Gartenb., Grossbeeren.

2516. Kapelev, I. G.
Trials on the use of sun-heated frames. [Russian.]
Sad i Ogorod, 1958, No. 1, pp. 20-2, illus.

On the southern shores of the Crimea vegetables can be grown throughout the year in cold frames. The most suitable were found to be double-spanned, 3 m. wide, 21·2 m. long (20 lights), the frames running north and south. In winter (January–February) the frame temperature did not drop below 5° C. even in frosty weather and was usually 5–7° C. in the morning and 10–12° C. during the day. The growing of tomato and cucumber in the spring-summer and of lettuce, onion tops and radish in autumn-winter is described.

2517. Krödel, F.
Versuchsbericht über Ultraschallbehandlung von Gemüsesaatgut 1957. **(A report on the ultrasonic treatment of vegetable seed in 1957.)**
Saatgut-Wirtsch., 1958, **10**: 108-10.

Ultrasonic treatment, at specific dosages, had a slightly unfavourable effect on the germination of bean, pea, carrot, celeriac and tomato seed. Treatment with antibiotics improved germination results only in the case of diseased bean and pea seed.—LandwKammer, Hanover.

2518. Sun, Ju.
The biological properties of the progeny grown from seeds obtained from different parts of cucumber (*Cucumis sativus*) and bean (*Phaseolus vulgaris*) plants and from different parts of cucumber fruits. [Chinese, with Russian summary.]
Acta agric. sinica, 1956, 7(4): 409-18, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,204.

At the Agricultural Institute "1 August", China, it was found that the absolute weight of seeds was greater in fruits and pods produced by the first flowers of cucumber and bean and greater also in the middle section of the cucumber fruit. In most cases such seeds germinated better and gave better developed, more productive plants. Moreover, seeds from the middle section of the cucumber produced plants with a higher percentage of female flowers, whereas those from the calyx end produced earlier ripening progeny.

2519. Sorokin, V. S.
Bee keeping in glasshouses. [Russian.]
Sad i Ogorod, 1958, No. 1, pp. 24-5.

Pollination by bees is shown to give many fold yield increases of cucumber but conditions within glasshouses are unfavourable for the bees. A method is described for arranging a beehive adjoining the glasshouse, with controlled access to both the house and the open air.

2520. WITTWER, S. H., AND BUKOVAC, M. J.
Gibberellin and higher plants: X. Field observations with certain vegetable crops.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 352-64, bibl. 8, illus.

In celery production, seed production in radish, and perhaps certain other long day annuals, and for early fruiting and increased vigor of determinate tomato varieties such as Fireball, important benefits from gibberellin are now apparent and its eventual use can be foreseen. With beans, cucumbers, muskmelons, peas, rhubarb and sweet corn, the potentially useful effects may not be realized without some control of accompanying unfavourable responses. [From authors' conclusions.]

2521. MORGAN, D. G., AND MEES, G. C.
Gibberellic acid and the growth of crop plants.
J. agric. Sci., 1958, **50**: 49-59, bibl. 12.

Gibberellic acid sprayed at 2 oz. and 4 oz. per acre on young turnips stimulated top growth but did not increase crop yield. Treatment of carrots at 6 oz. per acre when root length was 1–2 in. increased top growth, but reduced the harvest weight of roots by 15%. Vegetative growth was stimulated and crop size was unaffected when peas, runner beans and blackcurrants were sprayed at early fruit set with 4 oz. of gibberellic acid per acre. Webb's Wonderful lettuce, sprayed at 6 oz. per acre when nearly mature, showed no gain in fresh weight as a result, and the variety Blonde du Chatelet, sprayed before hearting, bolted and became unmarketable. Self-blanching celery showed no increase in growth rate after spraying at 4 oz. per acre at the 8–10 leaf stage.—I.C.I. Ltd., Jealott's Hill Res. Stat., Bracknell, Berks.

2522. GASKINS, M. H., THOMPSON, B. D., AND NETTLES, V. F.
Experiments with gibberellins at Gainesville in 1957.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 164-6.

Slurry seed treatments (10% methyl cellulose containing various concentrations of potassium gibberellate) and foliar sprays (potassium gibberellate + spreader-sticker) were applied to 9 vegetable crops. Early yields of beans were significantly improved by spray treatment. There were indications of a favourable effect on yields of eggplant, sweet corn and water-melons, but differences were not significant. Cucumbers were not affected by any treatment, and tomatoes were adversely affected by all treatments.—Fla agric. Exp. Stat., Gainesville.

2523. MCCUBBIN, E. N.
Results of treating cabbage, cauliflower and lettuce transplants with gibberellic acid.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 166-7.

No effect of a 10 or 50 p.p.m. gibberellic acid dip at transplanting was observed on growth of cabbage or cauliflower. Lettuce transplants showed marked stem elongation after treatment with 10 or 50 p.p.m. gibberellic acid, followed by the production of small non-marketable heads.—Potato Invest. Lab., Hastings.

2524. GERALDSON, C. M.
Response of pole beans, tomatoes, sweet corn and celery to gibberellic acid.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 167.

The effect of gibberellic acid treatment on vegetable growth and yield was only slightly affected by nutrient applications. Yields of marketable beans and tomatoes were reduced by 20 or 200 p.p.m. sprays applied to seedlings 10 days after emergence. Celery responded to GA treatment by a lengthening of the petioles; yield and quality of treated plants were inferior to those of untreated plants.—Gulf Coast Exp. Stat., Bradenton.

2525. LJUKOVA, L. A.
The effect of nicotinic acid on the growth and yield of some vegetable plants. [Russian, with English summary ¼ p.]
Fisiol. Rast., 1958, **5**: 24-30, bibl. 19.

Soaking the seeds of onion, lettuce, radish and tomato in 0·01 and 0·001% nicotinic acid and/or spraying the young plants with the same solution improved the growth and increased the sugar, vitamin C and chlorophyll contents of leaves. Of the 2 concentrations 0·01% was the better, and when applied either to the seed or to the plants it increased the yield of radish roots, lettuce leaves and onion tops both outdoors and under glass. With tomatoes the highest yields were obtained when seed treatment was followed by spraying the plants.

2526. MOSOLOV, I. V., LAPŠINA, L. I., AND PANOVA, A. V.
Calcium uptake by plants. [Russian.]
Udobrenie i Urožaj, 1956, No. 7, pp. 34-9, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 81,885.

In trials with tomatoes and some other plants Ca^{45} applied to the soil was found for the most part in the top young leaves. Ca^{45} applied to certain tiers of leaves was hardly translocated at all into other tiers. In water culture trials clover and *Nicotiana rustica* were grown with Ca^{40}+Ca^{45} until bud formation, and then with Ca^{40} only. Analyses showed the presence of Ca^{45} in organs which appeared after the exclusion of Ca^{45} from the nutrient mixture, while the Ca^{45} content of the lower leaves, stems and roots was reduced.

2527. (HADDOCK, J. L., HAUSENBUILLER, R. L., AND STANBERRY, C. O.)
Studies with radioactive phosphorus in soils of the Western States, 1950-53.
Prod. Res. Rep. U.S. Dep. Agric. **12**, 1957, pp. 32, bibl. 32.

Uptake of P from the soil and from applied fertilizer (concentrated superphosphate) is compared for various crops including castor bean, tomato and canteloupes. The fertilizer, used at 17·5 lb. per acre, was banded near the seeds at planting. From it canteloupes obtained 7·45%, tomatoes 4·78% and castor beans 1·28% of their total P.

2528. Simpson, K., and Hayes, S. F.
The effect of soil conditioners on plant growth and soil structure.
J. Sci. Food Agric., 1958, **9**: 163-70, bibl. 21.

Two forms of Krilium soil conditioner (HPAN and VAMA) and seaweed meal were tested in a series of field and pot experiments between 1952–1955. In most cases they produced considerable increases in the yield of radish and carrots. In one experiment on a clay loam soil, all VAMA treatments depressed the yield of radish. The optimum dressing was between 5 and 8 cwt. per acre of active material, use of 2 cwt. per acre being not always effective, and dressings greater than 8 cwt. per acre would be difficult to incorporate. Seaweed meal had little effect on crop yield. The time of germination was delayed in all soils, but percentage emergence was considerably increased by VAMA treatment in clay soils only. Seaweed meal hastened germination and increased percentage emergence. The degree of damping off was reduced by VAMA at 0·01 and 0·025% rates but increased by the 0·04% dressing. Seaweed meal induced almost complete damping off. The time of wilting under drought conditions in a sandy soil was delayed by 14 to 16 days by HPAN treatment. In a heavy clay soil treatment had no effect. The proportion of water-stable aggregates in the soil was increased in all cases by both HPAN and VAMA but was unaffected by seaweed meal. On a very sandy soil wind erosion was decreased by conditioner treatment. The duration of effectiveness of treatments of a clay subsoil was at least 42 months. [Authors' conclusions.]—Edin. E. Scot. Coll. Agric., and Dep. Agric. Univ. Edin.

2529. Holliday, R., and others.
Plant growth on "fly ash".
Nature, 1958, **181**: 1079-80, bibl. 7.

In work on the reclamation of land covered with pulverized fuel waste ("fly ash") it was found that boron is a major component of the "toxic principle" in this substance. Tolerant crops included beetroot, spinach and turnip and sensitive ones peas, beans, lettuce, carrots and parsnips, the moderately tolerant crops having no horticultural representative.—Dep. Agric., Univ. Leeds.

2530. Massey, P. H., Jr., and Judkins, W. P.
Sawdust mulch for vegetable crops.
Res. Rep. Va agric. Exp. Stat. 1953–1957, 1957, pp. 224-5, illus.

Sawdust mulching was compared to clean cultivation with eleven vegetable crops, and in general beneficial results were obtained. Yields were increased (cucumbers 332%, tomatoes 62%, lettuce 33% and snap beans 30%), soil moisture was conserved, and soil temperature fluctuations were reduced by the mulch. Soil organic matter content was increased but no change in pH or in Ca, Mg, P_2O_5 and K_2O contents of the soil were observed.

2531. Gray, R. A.
The downward translocation of antibiotics in plants.
Phytopathology, 1958, **48**: 71-8, bibl. 8, illus.

The antibiotics streptothricin and pleocidin, when sprayed on intermediate leaves of bean or tobacco plants at a concentration of 1%, were readily translocated, in high amounts, downward to older leaves and upward to the young leaves. When the primary leaves of bean plants were sprayed with streptothricin or pleocidin, the young untreated trifoliate leaves did not develop symptoms of common bacterial blight when inoculated with *Xanthomonas phaseoli*. Under the same conditions, streptomycin, dihydrostreptomycin, neomycin, oxamycin, bacitracin and actinomycin failed to move out of the sprayed leaves in detectable amounts. When primary leaves of bean plants were immersed in a solution containing 1,000 p.p.m. streptothricin, the antibiotic was translocated downward to the roots and upward to younger leaves. Several of the antibiotics that failed to move out of sprayed leaves were translocated upward and downward when applied by immersion of 1 leaf in a solution of the antibiotic. Streptothricin and pleocidin, when applied by immersion of 1 leaf in solutions containing 2,000 p.p.m. of the antibiotics, were translocated downward through steam-killed sections of petioles and stems to the older leaves below the ring, indicating that downward movement of these antibiotics was principally in the xylem. Streptothricin was also absorbed by the roots end intact stems of plants and translocated upward to all parts of the plant. Streptomycin amine and streptomycin oxime were converted in plants to compounds possessing much higher antibacterial activity than do the original materials. [Author's summary.]—Merck & Co., Inc., Rahway, N.J.

2532. Christie, J. R., and Perry, V. G.
A low-phytotoxic nematocide of the organic phosphate group.
Plant Dis. Reptr, 1958, **42**: 74-5.

A new nematocide, dichlorophenyl-diethyl-phosphorothioate, has given effective nematode control when applied as a drench to established bermudagrass or Kentucky bluegrass turf. It has been recommended for soil treatment before planting cucumber, capsicum, squash, strawberry and tomato.—Fla agric. Exp. Stat., Gainesville, and Agric. Res. Serv., Madison, Wis.

2533. Winstead, N. N., Wells, J. C., and Sasser, J. N.
Root-knot control in vegetable crops using D-D and EDB with and without vermiculite as a carrier.
Plant Dis. Reptr, 1958, **42**: 180-3, bibl. 7.

Field tests and demonstrations showed that root-knot nematode [*Meloidogyne incognita acrita*] control was as effective in row treatments when vermiculite was used as a carrier for D-D and EDB as comparable liquid treatments. Crops grown in treated soil included beets, broccoli, cabbage, collards, kale, cantaloupe, cucumber, squash, carrots, okra, bean, pole lima bean, pea, pepper and tomato. In one experimental test D-D treatments appeared to cause a temporary stunting of snapbeans early in the season; however, by time of harvest the stunting effects had disappeared. In one demonstration test beans planted on D-D treated plots did not recover. In all cases the nematocides, irrespective of method of application, gave satisfactory control of root-knot. [From authors' summary.]—N.C. St. Coll., Raleigh.

2534. HOGUE, D. V., AND BRIANT, A. L.
Determining flavour differences in crops treated with pesticides. I. A comparison of a triangle and a multiple comparison method.
Food Res., 1957, **22**: 351-7, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-86.

With green beans the findings by the two methods did not agree; in the triangle tests the plants treated with malathion, one application late, or dilan, one application early, were significantly better than the standard. In the multiple comparison test the sample treated with malathion one application early was rated significantly poorer. With squash both tests indicated that the endrin-captan sample was off flavour and the triangle test that the malathion-captan sample had a flavour better than the standard. The multiple comparison method took less time and fewer samples.

2535. WRIGHT, R. C. M.
Overhead wires kept off the pigeons.
Comm. Gr, 1958, No. 3254, p. 1147, illus.

Five-foot stakes were set 12 yds apart each way and wires stretched along the rows and diagonally across the crop. Among crops successfully protected in this way from pigeons were spring cabbage, sprouts and broccoli.

2536. KLIMCZAK, Z., AND PIEKARSKA, J.
Zawartość i skład błonnika w rożnych stadiach wegetacji warzyw. **(Content and composition of cellulose in vegetables at different stages of growth.)**
Roczn. Zakl. Hig., Warsaw, 1957, **8**: 67-73, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,491.

The content of cellulose pentosans and lignin was determined in the edible portions of kohlrabi, carrots, spinach and radishes, gathered at different stages of development. The percentage of cellulose increased during growth only in kohlrabi; it remained nearly constant in the other plants.

Artichokes.

(*See also* 2716o, q.)

2537. OSTAŠČENKO-KUDRJAVCEVA, A. K.
The globe artichoke. [Russian.]
Pčelovodstvo, 1957, No. 4, pp. 51-2, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,430.

A short description is given of the globe artichoke (*Cynara scolymus*), grown in the southern regions of the U.S.S.R. as a biennial and in the northern regions as an annual. Artichokes were found to secrete up to 2–4 mg. nectar of high sugar content per flower.

2538. REGGIANI, F.
I carciofi romaneschi. **(Roman globe artichokes.)** [English, French and German summaries 5–8 lines each.]
Frutticoltura, 1958, **20**: 31-6, bibl. 4, illus.

The Campagnano and Castellamare varieties are included in the term "Roman". Cultivation is described, with brief reference to pests and their control by aldrin.

2539. MILELLA, A.
Tecnica colturale del carciofo precoce in Sardegna. **(The technique of growing early globe artichokes in Sardinia.)** [English, French and German summaries 6 lines each.]
Frutticoltura, 1958, **20**: 37-40, illus.

Propagation from "ovuli" (basal shoots from stumped plants of the previous year); soil preparation; manuring; irrigation; rotation and mixed cropping; harvesting.

2540. MILELLA, A.
Effetti della concimazione minerale sulla precocità del carciofo in coltura annuale. **(Effects of mineral fertilizing on early maturity in annual crops of globe artichoke.)**
Studi sassaresi, Sez. III, 1955, **3**: 33-44, bibl. 1 [received 1958].

Among 11 different fertilizer treatments involving N, P and K, separately and in various combinations, those including K advanced the date of maturity of globe artichokes, even though the soil was naturally of high K status. The best results were given by combining 700 kg. of superphosphate, 300 kg. of ammonium sulphate and 350 kg. of potassium sulphate per ha.

2541. BARBIERI, R.
Influenza della concimazione minerale sulla produzione del carciofo. Esperienze condotte in agro di Sassari. **(Effects of mineral fertilizing on production of globe artichokes. Field experiments at Sassari.)**
Studi sassaresi, Sez. III, 1953, **1**: 132-44, bibl. 6, illus. [received 1958].

On soil of pH 7·6, moderate in N and P and fairly high in K and Ca contents, fertilizer application was localized round planting holes. The highest and earliest yield was obtained with 80 g. of 18–20 superphosphate and 25 g. of ammonium nitrate per plant (supplying 50 kg. of N and 150 kg. of P_2O_5 per ha.). Good results were also given by biammonium phosphate at 30 g. per plant.

2542. MARTELLI, M.
La nottua minatrice del carciofo in Sardegna. **(The noctuid miner of globe artichokes in Sardinia.)**
Studi sassaresi, Sez. III, 1954, **2**: 23-49, bibl. 30, illus. [received 1958].

The biology of *Hydroecia xanthenes* is described in detail. Apart from the removal of infested shoots or plants and the trapping of adult moths, control is best achieved by spraying with 1% emulsion of 25%-active DDT with a sticker, or dusting 4 times at fortnightly intervals with 10%-active chlordane or 2%-active dieldrin.

Asparagus.

(*See also* 2493, 2494, 2718g.)

2543. DE ZEEUW, A., AND VAN DER DOES, J.
De aspergeteelt. **(Asparagus growing.)**
Tuinbouwvoorlichting 6, 1957, pp. 55, illus.

The acreage of asparagus in the Netherlands has increased sixfold since 1938, largely owing to a favourable market in West Germany. Methods of growing in various areas are compared by means of cost analyses.

2544. Honma, S., and McArdle, F. J.
Black plastic for white spear production.
Amer. Veg. Gr, **6**(5): 45, illus.

Promising results have been obtained in preliminary tests on blanching asparagus spears by laying black plastic over the beds just before harvesting. This eliminated the need for ridging. The plastic also controlled weeds.—Mich. St. Univ., E. Lansing.

2545. LeCompte, S. B., Jr., and Blumenfeld, D.
Degree-days used to predict time of asparagus heavy cut.
N.J. Agric., 1958, **40**(1): 12-13, illus.

Studies of meteorological records show that the first cut of asparagus occurred on an average after 440 degree-days (base temperature 40° F.) or about 24,000 gram calories per sq. cm. after March 1. The first heavy cut occurred after an average of 613 degree-days, or about 29,000 gram calories per sq. cm. after March 1. The first heavy cut was made about 9 calendar days after the first cut, when each of these calendar days accumulated 9 or more degree-days. The degree-day method is considered the most accurate for forecasting the time of the first heavy cut.

2546. Downes, J. D.
The effect of harvest method on the yield and market value of asparagus.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 543-8, bibl. 4.

In comparing methods of harvesting asparagus, cutting produced about the same quantity of edible asparagus per acre as snapping. And although asparagus cut to 7 in. spears yielded 69% more than that snapped to 7 in. and 64% more than that snapped to 6 in., the gross returns per acre were not increased owing to the price ratio of cut to snapped asparagus. The highest net return per acre came from snapping.

2547. van der Vliet, M.
De voetziekte bij asperges. **(Wilt and root rot of asparagus.)**
Tijdschr. PlZiekt., 1958, **64**: 118.

Both *Fusarium oxysporum* and *F. culmorum* have been isolated from infected tissue. Dry disinfection of plants before planting out with TMTD- or captan-containing materials has resulted in stronger first-year growth than in untreated plants. Reduction in infection may be obtained by seed disinfection, by careful lifting of the plants, and by selection and dry disinfection of the young plants.

2548. Lange, W. H., Jr., Bailey, S. F., and Underhill, J. P.
Cutworms on white asparagus.
Calif. Agric., 1958, **12**(4): 13-14, illus.

Damage by the dark-sided cutworm (*Euxoa messoria*) was reduced from 12% to 0% by endrin baits. A 0·75%–1·0% endrin oil-base bait at 20–40 lb. per acre is effective under most conditions. Endrin baits are also effective for control of darkling ground beetles (*Blapstinus* spp.) in asparagus and other vegetable crops.—Univ. Calif., Davis.

Brassicas.

(*See also* 2071, 2126, 2716b, z, 2717 l, p, y, 2718d.)

2549. Conev, D. T.
The content of certain bound and free amino acids in brassicas. [Bulgarian, with Russian and German summaries ¾ p. each.]
Nauč. Trudy Visš selskostop. Inst. Georgi Dimitrov, Sofia, 1957, **4**: 133-7, bibl. 8.

Quantitative determinations were made of the free and bound fractions of the amino acids arginine, histidine, methionine, phenylalanine, tyrosine and tryptophane in white and red cabbage, cauliflower, savoy and brussels sprouts. It was found that except for tyrosine the proportion of free amino acids did not differ substantially from that of the same amino acids in the total protein of the test plants. [See also *H.A.*, 27: 2556n.]

2550. Faulkner, G. J., and Johnson, A. G.
Best spacing for quick-freeze sprouts.
Grower, 1958, **49**: 617-19.

Three dwarf varieties (The Canner, Freezer and Cambridge Special) produced sprouts satisfactory for quick-freezing, but also a proportion of oversized ones. In spacing trials the total yield per acre and the proportion and yield of sprouts under 1¼ in. in diameter increased with closer spacing. The greatest yield of sprouts 1–1¼ in. in diameter was obtained at 30×24 in. spacing.—Nat. Veg. Res. Stat., Wellesbourne.

2551. El Murabaa, A. I. M.
Factors affecting seed set in brussels sprouts, radish and cyclamen. [Dutch summary 1¼ pp.]
Meded. LandbHogesch. Wageningen, 1957, **57**(4): 1-33, bibl. 39, illus.

The effect of temperature and age of flower bud has been studied in cross- and self-pollination of brussels sprouts and radishes. Applications of α-naphthylacetamide or parachlorophenoxyacetic acid did not overcome incompatibility. No incompatibility was observed in cyclamen. Alpha-naphthylacetamide at 50 or 10 p.p.m. applied at emasculation or at both emasculation and pollination increased fruit set; flower stalks were elongated by α-naphthylacetamide treatment. [See also *H.A.*, 28: 1482.]—Lab. Tuinbouwpl., Wageningen.

2552. Eheart, J. F., Young, R. W., and Massey, P. H., Jr.
Factors affecting the nutritive value of collards.
Res. Rep. Va agric. Exp. Stat. 1953–1957, 1957, p. 215.

The effect of decreasing soil acidity by liming and of 4 nitrogen levels on the nutritive value of collards has been studied in a 4-year fertilizer experiment. Applications of lime resulted in an increase in protein and P contents, and a decrease in N-free-extract. With increasing N applications there was an increase in moisture, carotene, thiamine, riboflavin, protein and Fe contents, and a decrease in N-free-extract and dry matter contents.

2553. Turner, F., and McCall, W. W.
Studies on crop response to molybdenum and lime in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 268-81, bibl. 30, illus.

Molybdenum both as spray and soil application increased cauliflower yields, particularly when sufficient lime was applied in addition to bring the pH to 7·5. Molybdenum content of cauliflowers increased with an increase in soil pH.

2554. Bel'tjukova, K. G., and Kulikovs'ka, M. D.
Results of field trials on pre-sowing treatment of cabbage seed with the preparation "Bakterol A". [Ukrainian, with Russian summary.]
Mikrobiol. Ž., 1956, **18**(3): 45-7, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,507.

In the Ukraine soaking the seed of 3 cabbage varieties in a 0·1% solution of Bacterol A for 30 min. improved germination by 28–55% (depending on variety), reduced the incidence of *Xanthomonas campestris* and increased yields by 12–25%.

2555. Maklakova, G. F.
Conditions of club root infection. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk., 1958, **23**(2): 31-6, bibl. 5, illus.

Observations have shown that club root (*Plasmodiophora brassicae*) attacks both seedlings and older cabbage plants and is affected by environment. For control the following preventive measures are recommended: (1) Planting on well drained or elevated land. (2) Planting in groups on the square for good weed control and root aeration. (3) Raising seedlings in frames in peat with AMB or in nutrient blocks which do not contain soil. (4) Inspection of the root system of seed plants before replanting.

2556. Cetas, R. C.
The use of sodium methyl dithiocarbamate for the control of clubroot of crucifers.
Plant Dis. Reptr, 1958, **42**: 324-8, bibl. 3.

The application of 1 quart of V.P.M. (31% sodium methyl dithiocarbamate) per 100 sq. ft. as a drench resulted in good weed control and almost perfect control of clubroot of Chinese cabbage in naturally-infested fields. Broadcast application of V.P.M. followed by overhead irrigation 1 month before planting cabbage and cauliflower gave good plant growth with satisfactory clubroot and weed control. Band application followed by irrigation before planting out gave satisfactory results at 1 pint V.P.M. per 100 ft. of row. —Cornell Univ., Long Is. Veg. Res. Fm, N.Y.

2557. Altman, J., and Davis, B. H.
Experiments on the control of downy mildew of broccoli and bacterial spot of lima bean with streptomycin.
Plant Dis. Reptr, 1958, **42**: 416-19, bibl. 1.

Streptomycin nitrate at 50 and 100 p.p.m. significantly reduced downy mildew (*Peronospora parasitica*) of broccoli. Rates of 100 p.p.m. and higher were phytotoxic. A 200 p.p.m. spray of streptomycin applied to seedlings before transplanting may result in better control of mildew and quicker plant recovery than application to older plants. Three sprays of 200 p.p.m. streptomycin sulphate applied at 5-day intervals gave significant reduction of *Pseudomonas syringae* on lima beans, but the treatment may not be economical.—Rutgers Univ., N.J.

2558. McLean, D. M.
Some experiments concerned with the formation and inhibition of apothecia of *Sclerotinia sclerotiorum* (Lib.) D By.
Plant Dis. Reptr, 1958, **42**: 409-12, bibl. 12.

Sclerotia of *Sclerotinia sclerotiorum* (attacking crucifers) were only partially destroyed by burning crop refuse after harvest. In greenhouse tests, calcium cyanamid and Mylone completely inhibited formation of apothecia in the soil, while Terraclor and Vapam were highly effective. Results from field tests with cabbage are, so far, inconclusive.—Northwest. Wash. agric. Exp. Stat., Mount Vernon, Wash.

2559. Wilson, J. W., and others.
Experimental results of the control of the cabbage looper during the 1956-57 growing season.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 156-61, bibl. 6.

Endrin gave the most effective control of cabbage looper (*Trichoplusia ni*), and recommendations for its application are: 2 applications of 0·2 lb. per acre, at 10–14 day intervals before heading, followed by parathion (0·37 lb. per acre) at weekly intervals. Toxaphene gave good control at 2 sites. Phosdrin, malathion-perthane and thiodan gave promising results.

2560. Henderson, M.
Insecticidal control of the diamond back moth (*Plutella maculipennis* Curt.) on cabbages at Cameron Highlands.
Malay. agric. J., 1957, **40**: 275-9, bibl. 1, illus.

Spraying at weekly intervals from transplanting until 2 weeks before harvest with Basudin 20E containing 0·04% diazinon gave effective control. Dieldrin and malathion also controlled the larvae, but the former left residues on the leaves at harvest. DDT and BHC were ineffective.

Celery and celeriac.

(*See also* 2716r, 2717t.)

2561. Blondin, P.
Essais de céleri pomme en 1957. **(Trials with celeriac in 1957.)**
Rev. hort. suisse, 1958, **31**: 129-32.

The highest yields were obtained at a spacing of 35×40 cm., but weeding was difficult at this spacing. The largest roots were grown at a spacing of 30×60 cm., but yields were lowest. The behaviour of 20 varieties is compared.

2562. Eno, C. F., and Westgate, P. J.
Row orientation and its effect on the growth of celery and certain soil factors.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 115-20, bibl. 9.

Celery yields from north–south rows were 23·8% higher than those from east–west rows. Other effects observed were less blight at harvest, less blackheart and taller plants in north–south rows. It is suggested that these differences have resulted from more complete exposure of plants and soil in the N–S rows to the direct rays of the sun.—Fla agric. Exp. Stats, Gainesville and Sanford.

2563. Darby, J. F.
Fungicides for the control of early blight of celery.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 134-6, bibl. 3.

Ferbam gave excellent control of early blight of celery (*Cercospora apii*), and helped to correct a copper-induced iron deficiency. Sodium dimethyl dithiocarbamate, reacted with sulphates of Fe, Zn and Mn, gave similar results to commercially-prepared fungicides. Lithium carbonate showed promise as a soil and foliar spray, but at rates used in the tests phytotoxicity was severe. Outstanding new fungicides were Dyrene and the zinc salt of Omadine.—Centr. Fla Exp. Stat., Sanford.

Cucurbits.

(*See also* 2075, 2076, 2496, 2497, 2518, 2519, 2716j, k, s, 2717i, o, x, z, 2718i.)

2564. Harnisch, K., and Kaatz, M.
Zur Sommerkultur von Hausgurken im Mehrzweckegewächshaus Typ O der GPG Prof. Dr. Reinhold, Hagenow. **(Summer culture of cucumbers in a multipurpose glasshouse, type O, of the GPG Prof. Dr. Reinhold, Hagenow.)**
Dtsch. Gartenb., 1958, **5**: 29-31, illus.

A method of cucumber growing is described in which trenches were dug at 1 m. apart, filled with manure and covered with soil. The cucumbers were planted at the end of May. Grafted plants had earlier and higher yields than ungrafted plants. Yields were higher with pruning to the 2nd leaf than to the 1st leaf. Further studies on cucumber growing by this method are planned.

2565. Byčkova, Z. I.
Growing cucumbers between windbreaks and under polyamide film. [Russian.]
Sad i Ogorod, 1958, No. 3, pp. 23-5.

In the Leningrad province both direct-sown and transplanted cucumbers were grown on plots sheltered by strips of winter rye or under temporary plastic cover, or were given a combination of the 2 treatments. Both the windbreak and the plastic cover improved earliness and increased yields, the best results being obtained with plants raised in nutrient blocks and grown for 32 days under plastic with the protection of shelter rows.

2566. Eremenko, E. A.
Early cucumbers in the open. [Russian.]
Sad i Ogorod, 1958, No. 3, pp. 21-3, illus.

On the Black Sea coast of the Caucasus a great improvewas observed in both earliness and total yield of cucumbers by raising them in nutrient blocks and growing them on plots sheltered by rows of lupin or a vetch-oat mixture. Covering the plants over night with frames, for 10–15 days after planting, also gave very good results.

2567. Vidvei, E.
Kulturforsøk i frilandsagurk 1957. **(Cultural trials with outdoor cucumbers, 1957.)**
Gartneryrket, 1958, **48**: 134-6, illus.

Yields of outdoor cucumbers were increased as much by covering the seed for 3 weeks with wax paper or plastic cloches as by growing the seedlings in pots for 3 weeks before planting out, as compared with sowing in the field without covering the seedlings. The additional labour involved should be economically justified under Norwegian conditions.—Inst. Veg. Cult., Norwegian Coll. Agric.

2568. Vik, J.
Forkultur og solfangarforsøk i piklesagurk 1957. **(Pre-culture and cloche trials with pickling cucumbers.)**
Gartneryrket, 1958, **48**: 298-300, bibl. 1, illus.

Raising the plants in pots or sowing in the field under plastic covers proved superior to sowing in the open.—St. exp. Garden Landvik, Grimstad.

2569. Riethus, H., and Dodillet, H.-J.
Anbau von Treibgurken in verschiedenen Hydrosubstraten. **(Cultivation of glasshouse cucumbers in various water culture media.)**
Gartenbauwiss., 1957, **22**: 507-17, bibl. 2.

In a comparative trial on growing cucumbers in various media the best results were obtained with ground pumice stone. Yields were earlier and higher and total costs were lower for water culture with pumice stone medium than with soil culture.—Inst. Gemüseb., Berlin-Dahlem.

2570. Dubrovina, A. V.
Pre-sowing treatment of cucumber seeds with carbon monoxide. [Russian, with English summary ½ p.]
Fiziol. Rast., 1958, **5**: 16-23, bibl. 13.

Cucumber seed of 2 varieties was soaked in water for 24 hr, fumigated with CO by being placed in a desiccator with formic acid for 24 hr. and then sown outdoors. CO treatment at this very early stage of development caused metabolic changes in the plants resulting in more rapid and vigorous growth and earlier flowering. Changes were noted in the photosynthetic activity of the leaves and the colloids of the protoplasm; the water content in the tissues was higher and the viscosity of the protoplasm lower. CO treatment did not appear to affect the sex of the flowers, though it gave very appreciable yield increases. Ageing was retarded in the treated plants and seed quality improved. The treatment is recommended for indoor and especially outdoor grown cucumbers in a cold climate.

2571. Izakov, F. Ja., Loginova, T. Ja., and Basov, A. M.
The effect of a direct current electrical field on seeds. [Russian.]
Sad i Ogorod, 1958, No. 4, pp. 21-2.

When a layer of cucumber seed was placed between 2 electrodes through which D.C. at a potential difference of 0 to 6 kv./cm. passed for from 1 to 5 sec., germination was much better than in the control seed.

The highest percentage of germination resulted from treatment with 2 to 3·5 kv./cm. for 5 sec. and with 6 kv./cm. for 1 sec. The treatment also stimulated seedling development and increased the yield of the first picking by 50% and the total yield by some 20%.

2572. McCall, W. W., and others.
Fertilizer placement studies with the pickling cucumber.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 637-45, bibl. 4, illus.

Equipment developed for fertilizer placement with vegetable crops was used for application of a 12–12–12 fertilizer to pickling cucumbers. Plots with the highest yields were those on which N was broadcast, with band placement of P and K 2 in. to the side and 2 in. below the seed. Lowest yields were obtained from plots broadcast with fertilizer after ploughing.

2573. Ries, S. K., and Carolus, R. L.
The effect of nutrient level on growth of pickling cucumbers.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 659-68, bibl. 6, illus.

Adequate levels of fertilizer for pickling cucumbers under the conditions of this experiment appeared to be 20 lb. N, 80–160 lb. P_2O_5 and 80 lb. K_2O per acre. There were indications that more than 80 lb. K_2O per acre was beneficial when combined with high N. In fields with a low P test plants accumulated more P from fertilizer placed at the side than broadcast: in fields with high soil P method of application did not affect P level in the plants.

2574. Kribben, F. J.
Gibberellinsäure und Blattwachstum. **(Gibberellic acid and leaf growth.)**
Naturwissenschaften, 1957, **44**: 429, bibl. 2, illus.

Cotyledons and first foliage leaves of cucumber injected with a 50 γ/c.c. solution of gibberellic acid increased markedly in area within 8 hours of treatment, and after 3 days were more than 30% larger than untreated organs of the same seedlings.—Biol. Forschungsinst., Limburg/Lahn.

2575. Ito, H., and Saito, T.
Factors responsible for the sex expression of Japanese cucumber. (VIII.) Effects of a short period of long days and high night temperature, with application of growth substance sprays, on sex expression of cucumber. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 209-14, bibl. 4.

Sprays of NAA (10 p.p.m.) applied to cucumber seedlings during conditions of long photoperiods and high night temperature induced the formation of pistillate flowers. [For part VII see *H.A.*, 28: 1418.]

2576. Natti, J. J., and others.
Value of insecticide-fungicide combination treatments as protectants for seed of cucumber and winter squash.
Plant Dis. Reptr, 1958, **42**: 127-33, bibl. 3.

In seed dressings for cucumber and squash thiram and captan at 2 dosage rates were combined with dieldrin heptachlor or lindane in the ratios 1 : 4 or 1 : 8. Insecticide-fungicide treatment gave better total stands in most cases than fungicide treatment alone. Captan was superior to thiram in combination treatments for protection of squash seed in a silt loam; in fine sandy loam thiram was as effective as captan. Dieldrin gave better insect control on cucumber than heptachlor or lindane; no differences in insecticidal effect were observed with squash seeds.—N.Y. agric. Exp. Stat., Geneva.

2577. Aycock, R.
Effect of seed treatments on development of anthracnose in watermelon seedlings.
Plant Dis. Reptr, 1958, **42**: 134-41, bibl. 7, illus.

Semesan, Spergon and Arasan applied as protectants to water-melon seed at recommended rates did not control anthracnose (*Colletotrichum lagenarium*) satisfactorily on artificially infected seed. Bichloride of mercury treatments gave excellent results in most cases, but were inconsistent. Seedox, Panogen and Emmi gave excellent control of anthracnose, but more extensive tests are needed.—Edisto Exp. Stat., Clemson Coll., Blackville. S. Carolina.

2578. Schenck, N. C., and Crall, J. M.
Five year summary on fungicidal control of watermelon foliage diseases.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 107-9.

The diseases which were prominent in these tests were downy mildew (*Peronospora cubensis*), gummy stem blight (*Mycosphaerella citrullina*), anthracnose (*Colletotrichum lagenarium*) and leaf spot (*Cercospora citrullina*). The best results were obtained by alternate applications of maneb (1½ lb. per 100 gal.) and zineb (2 lb. per 100 gal.), or zineb alone. Copper fungicides gave satisfactory control of downy mildew, but were less satisfactory when several diseases were present. Nabam plus zinc sulphate or plus manganese sulphate are not recommended.—Fla agric. Expt. Stat. Leesburg.

2579. Lefering, T. W. L.
Invloed van enige fungiciden op de groei en de aantasting door schimmels bij augurk. **(The effect of some fungicides on growth and fungus infection in gherkin.)**
Tijdschr. PlZiekt., 1958, **64**: 119-20.

Maneb and karathane, alone and in combination, have been applied for anthracnose and mildew control. When mildew only was present karathane gave the best control. Maneb gave very good control of anthracnose and some control of mildew, but yields were reduced. Maneb was particularly phytotoxic to young plants. In practice, fewer sprays and lower concentrations of maneb may reduce its phytotoxic effect.

2580. Kublanovskaja, G. M., and Džalilova, V. M.
Biological control of fusarium wilt on melons. [Russian.]
Sad i Ogorod, 1958, No. 2, pp. 41-2.

Two strains of actinomycetes (No. 935 and 1699) antagonistic to *Fusarium oxysporum* were used in pot experiments and small scale field trials. In the pot experiments germination of melon seed was stimulated by application, 10 days before sowing, of oil cake at 2 t. per ha. or oil cake plus actinomycetes at 3 t. per ha., the latter being considerably more effective. In the field trials the actinomycetes-oil cake fertilizer was used in split applications. The greatest reduction of infection was obtained from 2 applications, but the highest yield did not coincide with the lowest disease incidence, indicating that the actinomycetes possess not only antibiotic but also growth stimulating properties.

2581. PRATT, H. K., AND OTHERS.
Tests of modified protective services in the transportation of honey dew melons from California to New York City, 1955 and 1956.
Veg. Crops Ser. Univ. Calif., **90**: 1957, pp. 15.

Half-stage standard refrigeration gave sufficient protection to honey dew melons when shipped in fan-equipped wagons. Shipping wagons on the day of loading, with ethylene applied just before icing and with a delay in the initial icing, shows promise but at present can only be recommended for well-matured warm melons.

Legumes.

(*See also* 2084, 2088, 2089, 2094, 2101, 2108, 2109, 2119, 2123, 2127, 2147h, 2498-2503, 2518, 2716a, 2717b, i, s, u-w, 2718a, n, 3213, 3226a.)

2582. UEKI, K.
Varietal differences in flowering and fruiting responses of broad bean to changes in night temperature. II. Effect of night temperature on flower differentiation and seed ripening in broad bean. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1956, **8**: 19-24, bibl. 7, illus.

Flower bud differentiation and growth rate in broad bean were accelerated by high night temperatures, but varietal differences in the effects were observed. Maturity and seed ripening were also accelerated. Pod set was also affected, especially in late varieties. [For part I see *H.A.*, 27: 1477.]

2583. UEKI, K.
Varietal differences in flowering and fruiting responses of broad bean to changes in night temperature. III. Influence of high night temperature on growth and fruiting. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1957, **9**: 1-10, bibl. 14, illus.

Stem length, leaf number and dry weight of beans were increased with high night temperature, and flowering was earlier and continued for a longer period. The length of the fruiting period and percentage fruit set was reduced. The growth rate of seeds was also affected, the response showing varietal differences.

2584. LANE, G. R., AND BUTLER, R. D.
Effect of a single light exposure on germinating broad bean seeds.
Nature, 1958, **181**: 1080-81, bibl. 4.

At 12–14 hours after the beginning of soaking broad bean seed, when the testa was still intact, a 2-hour exposure to light gave rise to a reduction of approximately 15% in the mean ultimate length of the first internode, as compared with seeds soaked and grown in complete darkness. The reduction reached a maximum of approximately 35% when the light was given at 3–4 days. From further observations and considerations it is suggested that light sensitivity begins to develop in the partially soaked, intact seed immediately the embryo has taken up water, although no cell division was observed until the third day. The possibility is being investigated that light sensitivity in the maturing seed is one of the factors contributing to the great variation in development within batches of seeds germinated and grown under the same conditions. —Dep. Bot., Univ. Southampton.

2585. INAKO, Y., HAMADA, K., AND FUJIKURA, T.
Fruiting habit of "Issun" broad bean. (I) Effect of date of planting on the fruiting habit. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 215-22, bibl. 8, illus.

Successive sowings of broad beans were made during the autumn. Growth continued during the winter, became rapid towards the end of March, but stopped at the end of April. Only 58–67% of the flower buds bloomed. Flower numbers increased with increasing temperature in the spring up to about 20° C., when numbers suddenly dropped. Plants sown earlier had more flower cycles. Flower set was about 5–9%; large pods were produced from flowers which had opened during the end of February and the beginning of March. About 790° C. degree days of heat summation were required from flowering to picking.

2586. GUTSCHMIDT, J.
Untersuchung des Reifeverlaufs grüner Erbsenkörner. II. Unstetigkeiten im Reifeverlauf verschiedener Markerbsensorten. **(Study of the course of ripening of green pea seeds. II. Irregularities in the course of ripening of different varieties of marrowfat peas.)**
Industr. Obst- u. Gemüseverw., 1957, **42**: 240-6, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,487.

Experiments were carried out with 5 varieties of marrowfat pea. Some of the varieties grown in Germany tended to show irregularities in maturation, as assessed by texture-meter measurements, and it is thus difficult to forecast their degree of maturity within 5 days. These irregularities may be partly the result of changeable temperature and weather, but there are indications that some metabolic processes concerned with starch may also be involved.

2587. OTTOSSON, L.
Growth and maturity of peas for canning and freezing.
Växtodling **9**, 1958, pp. 112, bibl. 5½ pp., illus.

The applicability of the heat-unit system to pea growth in southern Sweden has been investigated. Light conditions, soil type and nutrient supply were found to affect its usefulness to only a small extent. Various methods of determining the degree of maturity were compared, and tenderometer readings and contents of alcohol-insoluble solids have given the most satisfactory practical results. A yield curve has been calculated, based on field trials, which has proved reliable in the evaluation of variation in yield as a degree of maturity. Pea seed size is not a reliable measure of maturity. A smooth pea variety (Alaska) was found to develop and ripen more quickly than the wrinkled varieties studied. The optimum harvest time for wrinkled peas was found to be at a tenderometer reading of 110 under ordinary environmental conditions.—AB Findus, Bjuv.

2588. Seatz, L. F., Gilmore, T. R., and Sterges, A. J.
Effects of potassium, magnesium and micronutrient fertilization on snap bean yields and plant composition.
Proc. Soil Sci. Soc. Amer., 1958, **22**: 137-40, bibl. 5.

Snap beans were fertilized with 4 levels of Mg at each of 2 levels of K, and with Mn, Cu, Zn, and a micronutrient mixture at a single K level. Bean yields were not affected by any of the treatments. Top leaves, bottom leaves and leaf petioles were taken for chemical analysis when the beans were in the early bloom stage of growth. Mg content of the bottom leaves was higher than that of the top leaves and petioles. Mg. content increased with Mg applied and was higher at low K than at the high K level. Ca was also higher in the bottom leaves than in the top leaves or petioles. K content was higher in petioles than in leaves, and was higher at high K than at the low K level. No Mg effect was apparent. Mg content of petioles increased regularly with $Zn < Mn < Cu <$ Mixture treatments. Zn, Mn and Cu increased the Ca content of the bottom leaves. Zn reduced the K content of the bottom leaves. Bottom leaves contained a higher content of cations followed by petioles and top leaves. [Authors' abstract.]—Tenn. Agric. Exp. Stat., Knoxville.

2589. Pleškov, B. P., Ivanko, Š., and Antonova, G. V.
The effect of nutrition on the free amino acid content of bean leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **117**: 1070-3, bibl. 12, illus.

Quantitative paper chromatographic determinations were made of the amino acids in the leaves or beans grown in sterilized soil-sand culture with NPK, NK, NP and PK. The amounts of the 23 acids detected under these treatments are given. Arginine was most seriously affected by nutritional conditions, showing with NP a 150% increase and with PK an 85% decrease on the NPK figure. The total amount of amino acids was greatest with NP and smallest with PK.

2590. Sell, H. M., and others.
The effect of monochlorophenoxyacetic acids on the composition of bean plants (*Phaseolus vulgaris*).
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 306-10, bibl. 12.

The effect of the 3 forms of the acid on the composition of leaves, stem and roots was as follows: ether extract was increased in leaves and stem, reducing sugars decreased in stems by all forms and in roots by the p- form, non-reducing sugars increased in leaves and decreased in stems and roots, starch decreased in all parts, polysaccharides increased in stems and nitrogen increased in leaves and stems. In general m- and p- forms had greater effect than the o- form. Stunting and leaf shape modification was also most marked after p- form application.

2591. Humphreys, T. E., and Dugger, W. M., Jr.
The effect of 2,4-dichlorophenoxyacetic acid on the respiration of etiolated pea seedlings.
Plant Physiol., 1957, **32**: 530-6, bibl. 18.

The respiration rate of etiolated pea seedlings declined rapidly after removal of the cotyledons. Pea seedlings treated with 2,4-D were able to maintain a higher rate of respiration during this period of decline than were untreated seedlings. From the data presented it is postulated that 2,4-D increases respiration by causing more glucose to be catabolized via the pentose phosphate pathway. [From authors' summary.]

2592. Thurber, G. A., Douglas, J. R., and Galston, A. W.
Inhibitory effect of gibberellins on nodulization in dwarf beans, *Phaseolus vulgaris*..
Nature, 1958, **181**: 1082-3, bibl. 4.

The notable effects of gibberellin sprays on bean plants included up to fourfold enhancement of elongation without a significant increase in fresh weight and greatly decreased nodulization, especially in plants treated daily. The results indicate the need for caution in the application of gibberellins to leguminous plants.

2593. Dekker, J., van Andel, O. M., and Kaars Sijpesteijn, A.
Internal seed disinfection with pyridine-2-thiol-N-oxide and a derivative.
Nature, 1958, **181**: 1017, bibl. 5.

Lots of 200 pea seeds showing a high percentage of internal infection with *Ascochyta pisi* were sown in soil after soaking for 24 hours in aqueous solutions containing 0, 10, 25, 50, 100 and 200 p.p.m. of pyridine-2-thiol-N-oxide. The number of diseased plants emerging from these seeds was 20, 9, 3, 3, 2 and 1 respectively. The treatment had no harmful effect on germination or seedling development. A slurry of 92 mg. pyridine-2-thiol-N-oxide, 40 mg. carboxylmethylcellulose and 0·4 ml. water was applied to 80 bean seeds which were afterwards sown in soil. Of 54 plants developing from the treated seeds 2 showed symptoms of *Colletotrichum lindemuthianum* infection, while 80 control seeds gave rise to 53 plants of which 39 were infected. In another experiment with pea seed 2-pyridyl-N-oxide-isothiourea hydrobromide proved as effective as pyridine-2-thiol-N-oxide against *A. pisi.* The conclusion that both compounds are able to penetrate into the seeds was confirmed by bioassay of internal parts of treated seed.—Lab. Phytopath., Wageningen, and Inst. organ. Chem. T.N.O., Utrecht.

2594. Rombouts, J. E., and Kaars Sijpesteijn, A.
The chemotherapeutic effect of pyridine-2-thiol-N-oxide and some of its derivatives on certain plant diseases.
Ann. appl. Biol., 1958, **46**: 30-6, bibl. 9.

Limited systemic protection of broad bean against *Botrytis fabae* and of cucumber against *Cladosporium cucumerinum* has been observed as a result of leaf applications of pyridine-2-thiol-*N*-oxide and its carboxymethyl derivative. This protection is partly accounted for by translocation. Root applications were ineffective.—N. V. Philips-Roxane, 'sGraveland, and Inst. org. Chem., Utrecht.

2595. McEwen, F. L., Schroeder, W. T., and Davis, A. C.
Host range and transmission of the pea enation mosaic virus.
J. econ. Ent., 1957, **50**: 770-5, bibl. 34.

The hosts included many forage legumes. A parathion residue on pea plants was of insignificant value in preventing infection by immediate feeding of viruliferous aphids, though it will minimize the number of plants infected by a single aphid migrant and prevent the establishment of aphid colonies.—N.Y. St. agric. Exp. Stat., Geneva.

2596. Swenson, K. G.
Transmission of bean yellow mosaic virus by aphids.
J. econ. Ent., 1957, **50**: 727-31, bibl. 23.

Of 16 species of aphid tested for transmission of bean yellow mosaic, using mainly broad and dwarf beans as both source and indicator plants, one species failed to do so, while *Myzus persicae*, *Macrosiphum pisi*, *Anuraphis tulipae* and *Amphorophora sonchi* were very efficient. An unexpectedly low rate of aphid transmission was found in an isolate of the virus, indicating a loss of aphid transmissibility in this virus.—Ore. St. Coll., Corvallis.

2597. McEwen, F. L., and others.
The relative effectiveness of various insecticide-fungicide seed treatments on lima beans after several months storage.
J. econ. Ent., 1957, **50**: 775-7, bibl. 6.

Each of the insecticides diazinon, dieldrin and lindane was tested at 0·125 and 0·25 oz. per bushel of seed in combination with thiram at 1, 2 and 4 oz. against seed corn maggot (*Hylemyia cilicrura*) and seed decay fungi. In addition the materials were tested by themselves. Results of the immediate effectiveness of the treatments are given. After 8 months' storage it was found that all rates of thiram improved seedling emergence and that maggot control by treatments containing diazinon was better than that by treatments containing dieldrin or lindane.—N.Y. St. agric. Exp. Stat., Geneva.

2598. Restrepo, L. E., and Ruppel, R. F.
La efectividad residual de insecticidas en polvo en la protección de maíz y fríjol almacenados. **(The residual effectiveness of insecticidal powders for protection of stored maize and kidney beans.)**
Agric. trop. Bogotá, 1958, **14**: 47-50, bibl. 3.

The bean weevil (*Acanthoscelides obtectus*) was controlled to some extent over a period of 23 months by treating bean seeds with a mixture of 17 p.p.m. of piperonyl butoxide and 1 p.p.m. of pyrethrin before storing, but neither lindane at 5 p.p.m. nor methoxychlor at 10 p.p.m. gave any significant control.

2599. Reed, R. H.
Shelling beans for freezing.
Calif. Agric., 1958, **12**(5): 2, 14-15.

A comparison of costs of 3 stationary vining methods favours the most mechanized method, in which beans are conveyed to and from the viner on belts. Mobile vining involves high annual fixed charges, but running costs are low, and the use of a mobile viner becomes more advantageous as the season is extended.—Univ. Calif., Berkeley.

Mushrooms.

(*See also* 2716c, x, 2717c, g.)

2600. (International Commission for Mushroom Science.)
Mushroom Science III, being *Compte Rendu de la Troisième Conférence Internationale sur la Biologie et la Culture des Champignons tenue du 14 au 20 Juin, 1956, Paris.* **(Proceedings of the Third International Conference on the Biology and Cultivation of Mushrooms 1956)**, 1957, pp. 317, bibls, illus.

The papers read at the conference are published in French, German or English, with summaries in the other 2 languages. Several have been abstracted separately but those not abstracted are concerned with the following subjects: growing mushrooms in Europe and South Africa; nutritional value of mushrooms; maintaining production; pests and their control; methods of monosperm culture; composts and their preparation; mechanization of the tray system; research in Hungary, France and Denmark; submerged cultivation; and cultivation of mushrooms other than *Agaricus*.

2601. Seelkopf, C., and Schuster, H.
Qualitative and quantitative Aminosäurebestimmungen an einigen wichtigen Speisepilzen. **(Qualitative and quantitative determinations of amino acids in some important edible fungi.)**
Z. Lebensmitt. -Untersuch. u. -Forsch., 1957, **106**: 177-87, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,474.

Data were established concerning the amino acid content of protein extracted from well-known Continental edible fungi. Practically all the important amino acids were found to occur in mushroom protein, but the amounts of isoleucine and methionine were relatively low.

2602. Piedelievre, R., and Mallet, L.
Effet inhibiteur des extraits de champignons (*Psalliota campestris*) sur la germination des graines. **(The inhibitory effect of mushroom extracts on seed germination.)** [German and English summaries ½ p. each.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 79-83.

Germination of cress and onion seed was inhibited by aqueous extracts of mushrooms. It is suggested that the inhibition may be caused by an antibiotic substance in the extract.

2603. Flegg, P. B., and Gandy, D. G.
Size and form in the mushroom sporophore (*Psalliota hortensis*). I. Development of normal sporophores. [German and French summaries ½ p. each.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 119-28, bibl. 3, illus.

Four stages of growth in mushrooms have been defined.

t the pinhead stage, cap diameter and stipe diameter re about equal. The cap increases in diameter a slightly greater rate than the stipe until about the utton stage; then cap diameter only increases up to aturity. With cap expansion stipe height increases a slightly greater rate. In the final stages of growth ap expansion continues after vertical stem growth has opped. A numerical definition of a normal mushroom sporophore is proposed.

604. Gandy, D. G., and Flegg, P. B.
Size and form in the mushroom sporophore (*Psalliota hortensis*). II. Sporophore abnormalities. [German and French summaries ¼ p. each.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 128-37, bibl. 2, illus.

ypes of mushroom abnormalities collected in Great ritain have been classified. The greatest variations ave been observed in thickening or elongation of the ipe.

605. Block, S. S., and others.
Mushroom mycelium. Experiments with submerged culture. [German and French summaries ¼ p. each.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 261-8, bibl. 21.

he mycelium of *Agaricus blazai* has been grown in ubmerged culture in orange juice, citrus press water nd synthetic media. The mycelium is rich in amino cids and B vitamins, but lacks the true mushroom vour.

606. Willam, A., Trzcinski, T., and Willam-Engels, L.
La croissance du mycélium de morille. (**The development of *Morchella* mycelium.**) [German and English summaries 1 p. and ¾ p. respectively.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 283-308, bibl. 7, illus.

ycelium growth of *Morchella rotunda* was optimum about 25° C., but was not affected by light conditions. e best sources of C were amidon, saccharose, glucose d maltose. The optimum pH value for growth was out 7. Rapid growth of *Morchella* mycelium occurred a nutrient medium containing N, S, P, K, Na, Mg d Fe, and without Ca and Cl.

607. Rautavaara, T.
Herkkusienen viljely edistyy Neuvostoliitossa. (**Advances in mushroom growing in the Soviet Union.**) [English summary 15 lines.]
Puutarha, 1958, **61**: 10.

ields of mushrooms in kg. per sq. m. were: 11·41 om a 1 : 1 mixture of cattle manure and sawdust; 8 from a 3 : 7 mixture of horse manure and sawdust; 54 from a 1 : 3 mixture of horse manure and potato aulms with added ammonium sulphate and gypsum ach at 1 kg. per cu. m.; 6·7 from cattle manure with)% straw; and 4·79 from urban refuse covered with cm. of horse manure.

608. Flegg, P. B.
Casing layer additives.
Bull. Mushroom Gr Ass., 1958, No. 100, pp. 134-9, bibl. 3.

The addition of N, P and K salts at a rate of 50–300 lb. per 1,000 sq. ft. to the casing layer had a marked effect on fruiting. Fewer but heavier mushrooms were produced as levels of application increased. The addition of dry milled compost to the casing layer caused a delay in the start of fruiting, which was avoided by using wet milled compost. Yields were increased by 20–25% by applications of 2 oz. or 4 oz. dry milled compost per sq. ft. immediately after casing. The increase was a result of heavier average weight of each mushroom. The incorporation of milled peat in casing soil significantly increased numbers of mushrooms.—Glassh. Crops Res. Inst., Littlehampton.

2609. Rasmussen, C. R.
A simple method of judging when to finish peak-heating. [German summary ¼ p.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 163-5, bibl. 1.

The method is based on the relation between colour and colloid content of drainage liquid from the compost. The colour of this liquid becomes lighter until it reaches a point where there is no further change, and at this point peak-heating may be stopped.

2610. (Lambert, E. B., and Ayers, T. T.)
That table delicacy, the mushroom.
Agric. Res. Wash., 1958, **6**(9): 8-9, illus.

Heat treatment of compost for 7–10 days at 130° to 150° F. controls all animal pests and all but one of the fungus pests. Normal growth and maximum yield depend on aeration with at least 5 cu. ft. of fresh air per hour per square foot of bed. [See also *H.A.*, 27: 2457.]

2611. Willam-Engels, L., Trzcinski, T., and Willam, A.
Les engrais potassiques et la culture du champignon de couche. (**Potassic fertilizers and mushroom cultivation.**) [German and English summaries ¼ p. each.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 171-8, bibl. 8, illus.

Mushroom mycelium growth was more tolerant of SO_4 ions than of Cl ions in the substrate. Increasing applications of potassium chloride resulted in yield reductions, but it is suggested that this may be the effect of chloride ions rather than of potassium. Normally K contents of composts are adequate for mushroom growth.

2612. Plunkett, B. E.
The effects of aeration and light on toadstools.
Bull. Mushroom Grs' Ass., 1958, No. 99, pp. 76-9.

Both *Colybia velutipes* and *Polyporus brumalis* required light for normal cap development; low light increased stalk growth of *P. brumalis* but did not affect stalk growth in *C. velutipes*. 1% CO_2 reduced cap size in *C. velutipes* and 5% stopped cap growth, but 5% CO_2 had no effect on *P. brumalis*. Moisture-saturated air reduced cap growth of *P. brumalis* but did not affect *C. velutipes*; in the latter, however, growth was arrested when moving dry air caused a loss of 1·4 mg. of water vapour per sq. cm. per hour. Reducing atmospheric oxygen to 1% had no effect on either fungus.

2613. GOODMAN, R. N.
The effect of pentachloronitrobenzene (PCNB) on mushroom production.
Plant Dis. Reptr, 1958, **42**: 444-6, bibl. 2, illus.

Application of PCNB (250 p.p.m. or above) 24 hours after casing delayed production and reduced yields of mushrooms. Concentrations up to 1,000 p.p.m. had no adverse effect on yield when applied after harvest of the first flush.—Univ. Missouri, Columbia.

2614. ROCA DUMORA, J.
Les sels d'ammonium quaternaire et la culture du champignon. (**Quaternary ammonium salts and mushroom growing.**) [German and English summaries ½ p. each.]
Proc. 3rd int. Conf. Biol. Cult. Mushrooms, Paris, 1956, 1957, pp. 105-11.

A chlorine and a bromine derivative of quaternary ammonium salts were successfully used for sterilizing buildings, compost and casing soils. Compost and casing soil cannot be used immediately after treatment.

Onions and allied crops.

(*See also* 2504, 2505, 2508, 2717a, e, n, 2718h.)

2615. KAZAKOVA, A. A.
The effect of day length on the development of different species of *Allium*. [Russian.]
Tr. po prikl. Botan., Genet. i Selekcii, 1957, **31**(2): 122-30, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,423.

Onions (*Allium cepa*), garlic (*A. sativum*) and leeks (*A. porrum*) were grown in 8- and 12-hr. days at northern and southern experimental stations. The reaction of the species to the 2 day lengths and their behaviour in the 2 different latitudes is described. In all cases short day promoted vegetative growth and repressed bolting.

2616. KOMISSAROV, V. A.
On the biology of garlic. [Russian.]
Doklady Mosk. s.-h. Akad. im. K.A. Timiryazeva, 1956, No. 23, pp. 130-4, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,380.

Garlic varieties are divided into 3 groups. The winter varieties produce spikes bearing both aerial bulbils and flowers. The spring varieties are characterized by the absence of generative organs. A third intermediate group when planted in the spring resembles the spring-type garlic, but when planted in the autumn it produces short spikes with a few very small bulbils but no flowers. Vitamin C content of both bulbs and leaves varies greatly with variety. Experiments have shown that short-day (9 hr.) treatment stimulated vegetative growth and retarded the formation of bulbs and generative organs. Continuous light accelerated bulb formation and reduced the growing period.

2617. AURA, K.
Ryvässipulin (*Allium cepa* L. v. *solaninum* Alef.) idätyksen vaikutuksesta kukintojen kehittymiseen ja sipulin versomiseen varastossa. (**Effects of pre-planting germination on flowering and on sprouting during storage of onion setts.**) [English summary ⅔ p.]
Maataloust. Aikakaus., 1958, **30**: 24-9, bibl. 3, illus.

Flower-inducing effects of cold weather soon after planting were completely eliminated by germinating the setts for 8 or 13 days in an unheated greenhouse at an average 24-hour range of 30–8·9° C. before planting. These setts yielded 334 and 326 kg. per are respectively, as against 112 kg. from ungerminated setts, nearly half of this latter quantity being waste due to the production of about 5,000 flower heads. Setts pregerminated for 4 days, in spite of producing 340 flower heads per are, yielded only very slightly less than the non-flowering onions. Pregermination for 2 weeks advanced maturity of the bulbs by 3 weeks and greatly reduced sprouting during storage.

2618. ILDIS, P., AND D'ERSU, A. P.
Comportement de certaines variétés d'oignons en entrepôt frigorifique. (**Behaviour of some onion varieties in cold storage.**)
Cah. Lab. Froid Conserve, Ain Sebaa, Casablanca, 1957, No. 4, pp. 8, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,367.

Figures are given for the loss of weight, amount of shoots and roots, and extent of decay in onions of 12 varieties grown in French Morocco, after storage at 2° to 3° C. and R.H. 60 to 75% for 3, 5 and 7 months.

2619. ILDIS, P., OUARZAZI, N., AND D'ERSU, A. P.
Essais sur la conservation de l'oignon Jaune de Valence en entrepôt frigorifique en fonction de l'origine et de la date d'entreposage. Campagnes 1953-4 et 1954-5. (**Experiment on the preservation in cold storage of the onion Jaune de Valence in relation to its origin and to the date of storage. 1953-1954 and 1954-55 seasons.**)
Cah. Lab. Froid Conserve, Ain Sebaa, Casablanca, 1957, No. 4, pp. 30, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,368.

Onions grown at 5 places in French Morocco were stored at 2° C. and about 75% R.H.; at monthly intervals loss of weight, growth of shoots and roots, and amount and type of decay were examined. The findings are shown graphically. The state of the bulbs before storage with respect to the extent of contamination with micro-organisms and the amount of growth of shoots and roots is important in determining storage quality; bulbs should be dry before storing, and should be placed in cold storage without too long delay.

2620. RASMUSSON, L.
Störungen des Stoffwechsels von Obst und Gemüse bei niedrigen Temperaturen. (**Disturbance in the metabolism of fruit and vegetables at low temperatures.**)
Kältetech., 1957, **9**: 293-4, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,366.

A comparison was made of the keeping quality of onions stored at low temperatures; some were cooled rapidly and others slowly. For brief storage periods, not exceeding 2 to 3 months, rapid cooling is suitable; if storage is further prolonged, necrotic changes in the tissue occur. For long-term storage, i.e. 6 to 10 months, onions should be cooled in stages, to allow a process of acclimatization to take place.

2621. COMIN, D.
Onion tip-burn.
Res. Bull. Ohio agric. Exp. Stat. **798**, 1957, pp. 25, bibl. 6.

Tip-burn is distinct from blast. Its cause is not known but its incidence is reduced by wider spacing. Rows 16 in. apart with no more than one onion per inch in the row is recommended.

2622. GAUDINEAU, M., AND LAFON, R.
Traitements de la pourriture blanche de l'ail. **(Control of white rot of garlic.)**
C.R. Acad. Agric. Fr., 1958, **44**: 178-83.

Both soil and clove treatments of garlic with PCNB at 0·6% or TCNB at 3% have given effective control of *Sclerotium cepivorum*.—Stat. Path. vég. Sud-Ouest, I.N.R.A.

2623. RICHARDSON, B. H.
Control of onion thrips in the Winter Garden area of Texas, 1957.
J. econ. Ent., 1957, **50**: 828, bibl. 3.

In one experiment onion thrips (*Thrips tabaci*) was controlled 1 and 4 days after treatment with parathion, malathion, methyl parathion, Phosdrin or Chlorthion. In another trial the combination parathion+dieldrin was effective for 7 days. None of the chlorinated hydrocarbons controlled thrips when used alone. [For earlier work see *H.A.*, 27: 485 and 28: 1464.]

Root crops.

(*See also* 2103, 2139, 2505-2510, 2551, 2717j, m.)

2624. THEILLER, G., AND DELMAS, J.
Traitement de la carence en Mn sur betteraves rouges. **(Treatment of Mn deficiency in red beet.)**
Ann. agron., 1957, **8**: 725-6.

Where the soil pH was increased from 6·6 to 8·2 by liming, the beet plants developed deformed leaves with red pigment and brittle texture. Their Mg content was much higher and their Mn content much lower than in healthy leaves on unlimed soil. Spraying with manganese sulphate at 5, 10 or 20% with a spreader restored green colour in 4 days, but leaf scorch resulted from the highest dose.

2625. BANGA, O.
Effect of some environmental factors on the carotene content of carrots.
Pharm. Weekbl., 1957, **92**: 796-805, bibl. 11, illus., reprinted as *Meded. Inst. Vered. Tuinbouwgew.* **122**, 1958.

The thesis is presented that the ripening equilibrium (vegetative growth⇄root thickening) of the carrot root is the mechanism through which environmental factors influence its carotene content, carotene production being a consequence of ripening. The total carotenoid content of a growing root increased in proportion to its size (dry root weight) until a maximal content was reached. The content was higher in roots grown at 18° C. than in those at 8° C., and in closely spaced roots than in those with more room for growth. A high water table increased total carotenoid content.

2626. VIL'JAMS, V. V.
The biosynthesis of polyprene compounds in plants. Communication 4. (Cases of carotenoid formation in plants in the absence of chlorophyll.) [Russian.]
Izv. Timiryazev. s.-h. Akad., 1956, No. 1. pp. 201-16, from *Ref. Ž. (Biol.)*, 1957, No. 19, Abstr. 81,866.

During 2 seasons the dynamics of chlorophyll, carotene and phytoxanthin accumulation were studied in the leaves and roots of 2 red varieties of carrot, 1 orange variety with a low carotenoid content and Belgian white, the roots of which do not contain yellow pigments. The maximum chlorophyll content in the leaves occurred in varieties whose roots did not contain carotenoids. A change in the chlorophyll content of the leaves was accompanied by a reverse change in the total carotenoids in the leaves and roots. Accumulation of phytoxanthins in the leaves was accompanied by a decrease in the roots. A reduction of carotene in the whole plant was associated with increased phytoxanthins. It is suggested that carotenoids are translocated from the leaves into the roots.

2627. ZAHARA, M.
Planting carrot stecklings for seed production. Four transplanting methods compared.
Veg. Crops Ser. Univ. Calif. **91**, 1957, pp. 3.

Three machine methods were more economical than the hand method for transplanting young carrots. The cheapest and most efficient of the machines was a 4-row transplanter designed for root crops.

2628. WRIGHT, J. M., AND DECKER, G. C.
Insecticidal control of the carrot weevil in canning carrots.
J. econ. Ent., 1957, **50**: 797-9, bibl. 7.

Foliage sprays of DDT and lindane gave good control of carrot weevil (*Listronotus oregonensis*) on canning carrots in Illinois. DDT is also used against the six-spotted leafhopper (*Macrosteles fascifrons*), the vector of aster yellows on carrots, and very good control has been obtained of both insects by 4 applications of DDT at 1½ lb. per acre per treatment at 7–10-day intervals, starting when weevil oviposition begins, usually in late May.

2629. VIJZELMAN, H. E.
Bestrijding van de wortelvlieg door middel van zaadbehandeling. **(Control of carrot fly by means of seed treatment.)** [English summary ½ p.]
Meded. Proefst. Groent. Volle Grond Alkmaar **9**, 1958, pp. 23, bibl. 8, illus.

Several soil types and 7 insecticides were used in a study on the efficiency of seed treatment for control of carrot fly (*Psila rosae*). Good results were obtained with heptachlor (50% active ingredient), aldrin (40% active ingredient) and dieldrin (50% active ingredient). The stickers used were 4% methocel or 2% carboxymethylcellulose. Storage of seed treated with aldrin or dieldrin in bags for 2 months before sowing did not affect germination, but storage in closed bottles reduced it.

2630. REITAN, A., AND ROLL-HANSEN, J.
Lagring av gulrot i kjeller. **(Cellar storage of carrots.)**
Gartneryrket, 1958, **48**: 339-41, illus.

Spraying the foliage of carrots with maleic hydrazide 14 days before harvesting considerably reduced the growth of leaves and roots during winter storage. The treatment did not affect the weight of saleable carrots, but it greatly shortened the work of trimming, especially during the period April–June. Washing the crop immediately after harvesting had no harmful effect on storage life. The use of the fungicide Fusarex on carrots is not recommended.—St. Exp. Stat., Kvithamar.

2631. BRESLAVEC, L. P., AND OTHERS.
The effect of ionizing radiation on the growth and development of some agricultural plants. [Russian.]
Biofizika, 1956, **1**: 628-32, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 89,916.

The effect of X-rays on dry and soaked seeds of rice, radish and carrot was studied. Irradiation of dry radish seed with an X-ray dose of 500 r improved early plant growth and with 1,000 r increased root yields. Irradiation of dry carrot seeds with 1,000–2,000 r improved germination and increased the root length of the seedlings. Carrots from seed irradiated with 2,000–4,000 r gave the highest yield of roots with the greatest relative and absolute content of carotene.

2632. v. HÖSSLIN, R.
Der Einfluss verschiedener Anbaumethoden auf Form und Ertrag des Treibradieschens. **(The effect of different cultural methods on the shape and yield of forced radishes.)**
Gartenbauwiss., 1957, **22**: 518-26, bibl. 7, illus.

Radish plants were sown at several soil depths or transplanted at different spacings in a 3 years' trial in the glasshouse. There was shown to be a close direct relationship between the length of marketable root and that of seedling hypocotyl. The length of seedling hypocotyls was increased by deeper sowing, closer sowing, increased heat and, with transplants, temporary darkness. Root weight was increased in the longer roots, and fewer roots were spongy. Leaves were longer and there was a higher proportion of spongy roots when radishes were transplanted.—Inst. Gemüseb., Weihenstephan.

2633. SCHÜTTE, K. H.
Micro-nutrient deficiency and wilting in the radish.
Plant and Soil, 1957, **9**: 186-8, bibl. 5.

Radish plants grown in sand culture without one of the elements B, Cu, Mn or Zn wilted more rapidly under low moisture conditions than those supplied with all 4. Lack of Cu or Zn greatly increased susceptibility to wilting. Plants lacking B were resistant at first, but their susceptibility increased with age. Results for Mn deficiency were uncertain, as few plants survived, but these seemed to be as resistant as the controls. Decreased root development characterized plants lacking Cu, Zn or B, but the severity of wilting was not proportional to root weight.– Univ. Cape Town. [See also *H.A.*, 28: 68r.]

2634. WILSON, J. D.
Seek method to control radish disease caused by soil fungus.
Ohio Fm Home Res., 1956, **41**: 52-4, illus.

Of several soil fungicides tested for control of radish yellows caused by *Fusarium oxysporum* f. *conglutinans*, Larvacide (chloropicrin) at 30 gal./acre gave the most promising results. [See also *H.A.*, 26: 2827 and 28: 472.]

2635. OPSAHL, B.
Førsok med stammer av kålrot 1953–1956. **(Trials with strains of swede varieties 1953-1956.)** [English summary ¼ p.]
Forskn. Landbruk., 1958, **9**: 1-16, bibl. 3.

Six Bangholm strains showed the best table quality, but were susceptible to club root. A negative correlation was found between ascorbic acid content and yield of dry matter in the roots.

2636. READ, D. C.
Factors influencing infestation and injury of rutabagas by root maggots (Diptera: Anthomyiidae) in Prince Edward Island. I. Field studies.
Canad. J. Plant Sci., 1958, **38**: 188-98, bibl. 13, illus.

In general, early-planted swedes in sandy soil areas and late plantings in clay loam areas were severely damaged by cabbage root fly (*Hylemyia brassicae*), whereas late plantings in sandy areas and early plantings in clay loam areas were lightly infested. In sandy soil areas where all of the swede crops were harvested early in August, however, damage was relatively light. Use of farmyard manure increased infestations early in the season but did not significantly influence the damage caused during the whole growing season.—Canad. Dep. Agric., Charlottetown, Prince Edward Is.

2637. MADDOX, J. M.
Precision seeding the turnip crop.
Scot. Agric., 1958, **37**: 181-4, bibl. 2, illus.

The manner of use and efficiency of precision seeders are described. It has been possible to space turnips widely and omit singling and hoeing without loss of yield per acre. This results in a reduction in cost of growing turnips but precision seeders are used with most advantage on large acreages.

2638. STANHILL, G.
Effects of soil moisture on the yield and quality of early turnips. I. Response to different sustained soil moisture regimes.
J. hort. Sci., 1958, **33**: 108-18, bibl. 21.

Turnips (var. Early White Milan) were grown under 3 soil moisture regimes. Plots maintained at field capacity by daily watering gave the greatest fresh and dry weights of edible root and leaf material at harvest. The yield of edible roots was markedly reduced when watering was delayed until 50% of the available water in the root zone had been lost. Leaf area, weight and distribution of fibrous roots, and the quality of cooked roots were also affected by soil moisture regimes. The weight of water lost per unit weight of dry matter produced was greatest in plants from plots given the intermediate watering treatment.—Nat. Veg. Res. Stat., Wellesbourne.

2639. TOMLINSON, J. A., AND WEBB, M. J. W.
Control of turnip and cabbage mildew (*Erysiphe polygoni* DC.) by zinc.
Nature, 1958, **181**: 1352-3, bibl. 9, illus.

In pot experiments with turnips, mildew (*Erysiphe polygoni*) developed rapidly 34–62 days after inoculation on the leaves of plants in untreated soil, but infection was considerably less on plants grown in soil with 1·0 and 10·0% w/w zinc frit. Plants grown in soil with 10% Zn frit, however, became chlorotic. In a second experiment turnips grown in soil treated with 1·0 or 2·0% Zn frit or watered with solutions of Zn sulphate containing 500 p.p.m. Zn became only slightly infected with mildew, whereas plants in untreated soil became heavily infected after 63 days. In a third test heavily mildewed 8-week-old turnip plants watered with Zn sulphate solution containing 500 p.p.m. Zn developed new leaves which remained uninfected, whereas on plants watered with demineralized water or Zn sulphate solution containing 100 p.p.m. Zn new leaves became heavily infected. Similar results were obtained with cabbage, but with cucumber, chrysanthemum and marrow plants soil treatment with Zn frit or Zn sulphate did not reduce the amount of mildew (*E. cichoracearum*). Analyses showed that in all cases leaves of treated plants contained more Zn than those of the controls. It is therefore suggested that *E. cichoracearum* may be more tolerant than *E. polygoni* of high Zn concentrations in the leaves.—Nat. Veg. Res. Stat., Wellesbourne, Warwick.

2640. BECKHAM, C. M., AND TIPPINS, H. H.
The effectiveness of several insecticides against the vegetable weevil.
J. econ. Ent., 1957, **50**: 832-3, bibl. 3.

In field experiments in Florida malathion and parathion dusts gave good control of vegetable weevil (*Listroderes costirostris obliquus*) larvae on turnips, while with methoxychlor the control was inadequate. In the laboratory lindane, malathion and parathion were highly toxic to adult weevils and methoxychlor was relatively non-toxic.

Salad crops.

(*See also* 2076, 2115, 2122, 2716e, h, y, 2718b, c, k, 3215.)

2641. KAHN, H.
The forcing of chicory.
World Crops, 1958, **10**: 172, illus.

Yield increases of up to 50% can be obtained by warming the soil in which the roots are forced to about 18° C. for about 3 weeks. The best method is by electric elements in tubes permanently buried in the beds. The roots are covered with 4 in. of soil, insulated by a layer of straw and protected with curved G.I. sheets.

2642. POST-BAKKER, M.
Boriumgebrek bij witlof. (**Boron deficiency in chicory.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1958, **21**: 162-9, bibl. 6, illus.

In a water culture solution with 0·6 mg. boric acid per litre chicory plants were healthy, but at lower B levels symptoms of deficiency appeared and these are described. Plots with and without borax were arranged on a B-deficient soil. Symptoms of B deficiency were slight in the aerial parts of plants on plots without borax, but root production was reduced, and a brown dry rot occurred in the main roots. The appearance of B deficiency symptoms was not encouraged by wet summers. Internal root necroses had no effect on yields of forced chicory.—Inst. PlZiekt. Onderz., Wageningen.

2643. ANDREWS, F. S., CHAPPELL, W. E., AND WOODSIDE, A. M.
Land cress—culture and pest and weed control.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 215-17.

Cultural studies with land cress (*Barbarea verna*) were started at Blacksburg in 1955. The germination of 1-year-old seed was in general higher than that of 2-year-old seed. Optimum sowing depth varied according to soil type, but was between ¾ in. and ¼ in. deep. Mulching with sawdust or black plastic after sowing before a partial drought increased seedling emergence and uniformity of stand. Black plastic used to cover the soil 13 or 27 days before and for 5 days after sowing was effective in controlling weeds and improving plant stand. Yields were highest at 3 in. spacing, but picking was easiest at 6–9 in. spacing. Aphid populations were markedly reduced by malathion sprays. Presowing treatments of CIPC and CDEC, alone or in combination, gave satisfactory weed control. These materials and Mylone were not toxic to land cress.

2644. JANEŽIČ, F.
Črna listna pegavost endivije. (**Leaf-spot of endive.**) [English summary 1½ pp.]
Zborn. Kmet. Gozd., 1957, No. 3, pp. 3-37, bibl. 33, illus.

The symptoms of leaf-spot of endive and, in a milder form, of chicory are described and the biology and taxonomy of the causal fungus (*Alternaria* sp.) are discussed. Control measures recommended include crop rotation, wide spacing (30–40 cm.), seed disinfection and spraying with 1% bordeaux mixture.

2645. WATTS, L. E.
Natural cross-pollination in lettuce, *Lactuca sativa* L.
Nature, 1958, **181**: 1084, bibl. 3.

Using pigmented and unpigmented varieties, the author showed that natural cross-pollination in lettuce occurs when the population of pollinating insects (hover-flies) is sufficiently high.—Nat. Veg. Res. Stat., Wellesbourne.

2646. HEYDECKER, W.
Effect of anaerobic conditions on imbibed lettuce seeds.
Nature, 1958, **181**: 1140-1, bibl. 3.

Experiments have shown that lettuce seed is capable of germinating, though not of growing rapidly, when exposed to an atmosphere of 80% N, 5% O_2 and 15% CO_2. To test the respective effects of deficiency of O_2 and excess of CO_2, seeds were allowed to imbibe for 6 or 12 hr. and were then exposed to atmospheres of N or CO_2 for 1 or 2 weeks, during which no seeds germinated, and were finally returned to air. Anaerobic treatment for 1 week in N after 0–12 hr. or in CO_2 after 0–6 hr. imbibition in air did not affect subsequent germination capacity, but there was an abrupt reduction in the proportion of seeds surviving CO_2 treatment following 12 hr. imbibition, accompanied by excessive swelling of the seed and necrosis of the unemerged radicle. This suggests a specific effect of CO_2 from a certain stage of seed activation onwards, and may account for the occurrence of seeds with blackened radicles often found in seed boxes in which the soil has been too wet.—School Agric., Univ., Nott.

2647. Evenari, M., and others.
The influence of gibberellic acid and kinetin on germination and seedling growth of lettuce.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 65-72, bibl. 11.

Kinetin in various concentrations (10^{-5} to 10^{-4} M) stimulated lettuce seed germination in the dark. Root growth was inhibited, but hypocotyl growth was not affected. The application of red light with kinetin further increased germination, and the effect was not reversed by far red light. Red light did not affect root growth inhibition induced by kinetin. Gibberellic acid stimulated germination in the dark at concentrations of $2{\cdot}9 \times 10^{-5}$ and $2{\cdot}9 \times 10^{-4}$ M. Root and hypocotyl growth were not affected. Red light increased the stimulatory effect of gibberellin; far red partially reversed the effect of gibberellin. The presence of gibberellic acid did not affect the sensitivity of lettuce seeds to red light.—Hebrew Univ., Jerusalem.

2648. Kurki, L.
Gibberellihapon vaikutuksesta eräisiin puutarhakasveihin. **(Effects of gibberellic acid on some horticultural plants.)** [English summary 8 lines.]
Maataloust. Aikakaus., 1958, **30**: 20-3, bibl. 21.

Among various plants treated with 0·25 mg. of gibberellic acid, lettuces flowered without forming hearts in an environment which kept untreated controls vegetative. Dahlias flowered 7–9 days earlier than controls. There was no visible response in green sprouting broccoli or freesia.

2649. Poljakoff-Mayber, A., Evenari, M., and Neumann, G.
Effect of red light and gibberellic acid on the temperature-inhibited germination of lettuce seeds.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 99-102, bibl. 5.

Red light did not break dormancy of lettuce seeds induced by heat when given at 30° C. Red light irradiation was effective when the seeds were subsequently germinated at 26° C. The presence of gibberellic acid during heat treatment prevented the development of complete heat dormancy. The possible mechanisms of red light and gibberellic acid effects are discussed.—Hebrew Univ., Jerusalem.

2650. Poljakoff-Mayber, A.
The effect of auxin and anti-auxin on germination of lettuce seeds.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 78-81, bibl. 11.

The germination of dormant lettuce seeds was stimulated at certain IAA concentrations, but high levels inhibited root growth. The anti-auxin 4-chlorophenoxyisobutyric acid did not affect germination or root growth. [See also *H.A.*, 28: 474.]—Hebrew Univ., Jerusalem.

2651. Fukui, H. N., and others.
Natural growth substances in vernalized and non-vernalized lettuce seedlings.
Amer. J. Bot., 1958, **45**: 73-4, bibl. 4.

Ethyl ether extracts of vernalized and non-vernalized lettuce seedlings were fractionated into acid and "neutral" fractions. Paper chromatographic separation followed by bioassay with the *Avena* straight growth test demonstrated the presence of twice the amount of IAA in the acid fraction of the non-vernalized seed as compared to that which was vernalized, and two growth promoting substances in the "neutral" fractions of both the vernalized and non-vernalized seed. [Authors' summary.]—Mich. St. Univ., E. Lansing.

2652. Poljakoff-Mayber, A.
The effect of eosin on germination of lettuce seeds.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 82-5, bibl. 12.

High concentrations of eosin inhibited lettuce seed germination. It is suggested that eosin may act as a photosensitizer in the inhibition of germination by blue light.—Hebrew Univ., Jerusalem.

2653. Poljakoff-Mayber, A., and Mayer, A. M.
Some further studies on the direct oxidation of glucose in germinating lettuce seed.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 86-7, bibl. 4.

Glucose 6-phosphate and 6-phospho gluconic acid dehydrogenases were shown to be present at a high level in dry seeds and decreased in activity with time of germination. A shifting metabolic pathway is suggested. Neotetrazolium chloride from various sources showed different sensitivity to the malic dehydrogenase system. [Authors' abstract.] [See also *H.A.*, 28: 534x.]—Hebrew Univ., Jerusalem.

2654. Mayer, A. M., and Poljakoff-Mayber, A.
The joint action of thiourea and copper on the germination and growth of lettuce.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 88-90, bibl. 3.

Copper chloride gave maximum stimulation to lettuce seed germination when the seed was soaked for 2 hours in a 10^{-2} M solution. Copper ions did not reverse the effect of thiourea on lettuce germination.—Hebrew Univ., Jerusalem.

2655. Mayer, A. M., Poljakoff-Mayber, A., and Zacks, S.
The interaction of thiourea and ascorbic acid in their effect on germination and growth.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 103-7, bibl. 6.

A clear interaction between thiourea and ascorbic acid has been observed on lettuce germination and growth. The effect on germination is synergistic, and that on growth is antagonistic. It is suggested that its antagonism to growth may be due to the inhibition by thiourea of ascorbic acid oxidase, and consequent depression of the amount of dehydro-ascorbic acid in the seeds. The effect on germination cannot yet be explained.—Hebrew Univ., and Res. Coun. Israel, Jerusalem.

2656. Poljakoff-Mayber, A., Mayer, A. M., and Zacks, S.
The interaction of thiourea and coumarin in germination and growth of lettuce.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 118-24, bibl. 18.

Combined application of thiourea and coumarin to lettuce seeds resulted in a higher percentage germination than with coumarin alone, but lower than with thiourea alone. Increasing concentration of both thiourea and coumarin resulted in inhibition of hypocotyl and root growth; with combined application thiourea reversed the coumarin effect to some extent.—Hebrew Univ., Jerusalem, and Res. Coun. Israel.

2657. Evenari, M., Neumann, G., and Poljakoff-Mayber, A.
The respiration of lettuce seeds germinated at a high temperature.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 108-10, bibl. 8.

Lettuce seeds germinated at 30° C. showed a higher rate of respiration than those germinated at 26° C. The respiration rate declined after the 22nd hour of imbibition.—Hebrew Univ., Jerusalem.

2658. Cohen, D.
The mechanism of germination stimulation by alternating temperatures.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 111-17, bibl. 6.

No correlation was found between the rate or duration of temperature change and germination of lettuce seed. Germination stimulation was correlated with temperature change, the critical temperatures being between 23° and 32° C.—Hebrew Univ., Jerusalem.

2659. Evenari, M., Neumann, G., and Poljakoff-Mayber, A.
Respiration studies with lettuce seeds imbibed for very long periods.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 125-6, bibl. 8.

Lettuce seeds, imbibing for long periods under conditions unfavourable to germination, showed a decline in respiration rate after the first 24 hours, which continued until, after 15 days of imbibition, the rate was similar to that of dry seeds. No measurable changes in lipid content were apparent, and glucose content did not increase. Sucrose content did decrease during the first 3 days of imbibition, but subsequently the decrease was only slight.—Hebrew Univ., Jerusalem.

2660. Kamson-Rappaport, M.
Changes in the ascorbic acid content of germinating lettuce seeds.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 126-7, bibl. 4.

In lettuce seeds germinated at 20° C. or 26° C. the ascorbic acid content rises most rapidly between 48 and 72 hours after germination has been completed. Coumarin depressed ascorbic acid formation in the light, but in the dark it caused an initial rise at 48 hours followed by a decrease after 72 hours.—Hebrew Univ., Jerusalem.

2661. Grant Lipp, A. E., and Goodall, D. W.
Nutrient interactions and deficiency diagnosis in the lettuce. IV. Phosphorus content and response to phosphorus.
Aust. J. biol. Sci., 1958, **11**: 30-44, bibl. 8.

Lettuce plants grown in sand culture, with N, P and K at 5 levels in all combinations, were analysed at different stages of growth for these elements. An attempt was made to relate these analytical data to the growth responses following a supplementary P application. The concentrations of P in plant dry matter usually increased with increasing P levels, but decreased with N and K. Increases in P content were greatest when K was deficient or N was abundant. Additional P supplied 46 days after sowing caused an increase in dry weight which was related to the previous P contents of the plants. The date of sampling for analysis did not appear to affect the precision with which response to P could be forecast. There seemed to be no advantage in analysing selected organs. The relationship between P content and response was approximately linear. [For part III see *H.A.*, 28: 477.]—Bot. School, Univ. Melbourne.

2662. Brook, M., and Chesters, C. G. C.
Trials of tecnazene smoke generators for the control of *Botrytis* in lettuce.
Plant Path., 1958, **7**: 6-9, bibl. 5.

Tecnazene (2:3:5:6-tetrachloronitrobenzene) smokes gave control of *Botrytis* on lettuce when used at a rate of 1 oz. per 200 sq. ft. of bed, and there were indications that tecnazene smokes had a protective fungicidal effect. In a comparison of smoke and dust treatments [see also *H.A.*, 23: 1932], control with dusts was superior. Tecnazene smoke at 1 oz. per 1,000 cu. ft. was safe for control of *Botrytis* on established tomatoes and chrysanthemums, but young tomato plants were damaged at half this dose.—Dep. Bot., Univ. Nottingham.

Spinach.

(*See also* 2717d.)

2663. Crnko, J.
Comportamiento de variedades de espinaca en "La Consulta", Mendoza. **(Behaviour of spinach varieties at "La Consulta", Mendoza.)**
Idia, 1957, No. 112, pp. 18-31, bibl. 8, illus.

Characteristics of 17 spinach varieties are described with special reference to times of sowing and harvesting, sex expression and seed production. Suitability for processing is indicated in some instances.

2664. Kagawa, A.
Studies on the floral induction of slow-bolting spinach. (II) Effects of temperature for seed vernalization and of drying chilled seeds on flowering of spinach. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 230-5, bibl. 12.

Spring-sown spinach seed, after vernalization at 2° and 5° C., showed normal flowering and seed production. When vernalized seed was sown in October flower initiation was accelerated, but flower stalk elongation was delayed by the short-day conditions;

after bolting in the spring, flowering was abnormal and seed production was low. The effect of vernalization was not reversed by drying seeds for 1–2 weeks after treatment, but germination was greatly retarded. [For part I see *H.A.*, 27: 1537.]

Tomatoes and other Solanaceæ.

(*See also* 2067, 2093, 2099, 2177, 2126, 2499, 2716i, m, n, p, t-w, 2717f, h, q, 2718e, f, m, 3204, 3205, 3215, 3221.)

2665. PUTTER, J., LOEBENSTEIN, G., AND SLOMNICKI, I.
Determining sample size in field experiments with tomatoes.
Ktavim, 1958, **8**: 21-3, bibl. 3.

It is concluded that at least 5 replicates are necessary for tomato variety trials. Under the conditions of the experiment studied the best combination was 7 replicates of 15 plants each.

2666. BRABEC, F.
Über Beziehungen zwischen Atmungswerten und Zellgrössen. (**On relations between respiration rate and cell size.**)
Planta, 1958, **50**: 622-39, bibl. 29.

The rate of CO_2 emission was determined in tomato seedlings. The same seedlings were then induced experimentally to develop the gigas form which was characterized by succulence due to larger cells with a high water content. Repeated determinations showed that plants with enlarged cells emitted significantly less CO_2 than those with normal cells. It is suggested that the differences in respiration rate encountered were due to differences in cell size.—Staatsinst. allg. Bot., Hamburg.

2667. ALPAT'EV, A. V., AND ERINA, O. I.
Methods of hardy tomato selection. [Russian, with English and German summaries.]
Vestn. s.-h. Nauki, 1957, No. 3, pp. 17-26, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,372.

A description is given of methods of raising, growing and evaluating tomato hybrids of geographically distant forms and of hybrids from repeated inter- and intra-hybrid crossings. At low temperatures the best germination was shown by seed of the 2nd hybrid generation from intra-hybrid crossing, which also showed the highest cold- and frost-resistance, under natural conditions up to −3° C. and under artificial up to −7° C. (2–8% of the controls and 50% of the hybrids surviving). At the end of the growing period hardiness declined and varietal differences in this respect were obliterated. A positive correlation was established between hardiness and earliness. Hybrids from intra-hybrid crossings were 16–30% more productive than the controls.

2668. NAZAROV, S. P.
Variation of inherited characters in inter-family grafts. [Russian.]
Priroda, 1958, **47**(2): 117-18, bibl. 1, illus.

Of seeds of inter-family grafts [see *H.A.*, 26: 2835] only those of tomato on cucumber germinated. A study was made of 2 seedling generations. In F_1 some elongated fruits appeared and in F_2, derived from these, creeping stems and very tough or mottled fruits were noted.

2669. MOISEEVA, M. N.
Root formation by the scion in grafts of solanaceous and other plants. [Russian.]
Bot. Žurnal, 1958, **43**: 85-92, bibl. 12, illus.

Anatomical investigations on tomato grafted on potato have shown that the scion produces roots which grow into the cavity or the medulla of the rootstock and then usually dry up after complete union has taken place. In other graft combinations, i.e. tomato or maize on squash where apparent "union" occurred, the scion roots actually penetrated through the hypocotyl of the rootstock into the soil.

2670. KONONKOV, P. F.
The rôle of the pollen of the maternal variety in intervarietal crossing of tomatoes. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **23**(1): 16-19.

The addition of self pollen to either a single or mixed foreign pollen markedly increased the vigour and yield of tomato hybrids in the first and successive generations.

2671. GOROBEC, A. M.
The storage life of tomato pollen. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **23**(1): 11-15.

Pollen of 2 tomato varieties stored in the laboratory at 18–25° C., when tested by cross-pollination, was found to retain its normal fertilizing ability for 4 days. Whereas the percentage of fruit set was not reduced by a further 3–4 days' storage, the weight of fruits and the number of seeds per fruit diminished.

2672. ZAGORODNYJ, G. P., AND SULTANOV, Z. D.
The effect of pre-sowing seed treatment with microelements on the growth and development of tomato plants. [Russian.]
Tr. Dagest. s.-h. In-ta, 1956, **9**: 9-15, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,410.

Treatment of tomato seeds with $MnSO_4$, $ZnSO_4$ or H_3BO_3 improved growth and increased yields. The best results were obtained with 0·5% solutions of Mn and Zn. The microelements improved photosynthesis and reduced flower and fruit drop.

2673. CAMPBELL, J. S.
Influence of transplant type and starter solution on tomato yields in Trinidad.
Trop. Agriculture Trin., 1958, **35**: 134-44, bibl. 13.

Plants, grown in 3 in. clay pots, under open-sided greenhouse conditions and later transplanted to the field, have been markedly superior to plants produced on open seedbeds, when the seed has been originally broadcast thickly. If seedlings are spaced 3 in. × 3 in. on an open seedbed [by sowing thinly in drills 3 in. apart and thinning to 3 in. a week later], results are intermediate between those of the pot method and the local broadcast seedbed method. The application of a mixed soluble fertilizer or "starter" solution at the rate of ¼ pint per plant at transplanting has markedly increased early and total yields of fruit. [From author's summary.]—Imp. Coll. trop. Agric.

2674. Fröhlich, H.
Zu Fragen der Bodenheizung bei der Treibtomatenkultur. (**Problems of soil heating in growing forced tomatoes.**)
Gartenbauwiss., 1957, **22**: 491-506, bibl. 24, illus.

In 2 experiments with January-planted tomatoes soil heating at 15–23° C. from January to April resulted in reduced yields and quality. The optimum soil temperature appears to correspond to the optimum air temperature, which depends on the prevailing light conditions. In January and February light intensity is too low to allow soil heating to be of value to the tomato plants.—Inst. Gartenb., Grossbeeren.

2675. Malcolm, J. L., and Harkness, R. W.
Irrigation experiments with tomatoes on a Rockdale soil.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 126-33, bibl. 9.

Tomato plants growing in a sandy loam soil were given 13 irrigation treatments. In the early part of the season vigour was closely correlated with the amount of water applied. Plants given no irrigation or 1 inch every 2 weeks remained dark green until the end of the tests, and their leaflets contained significantly higher Ca and less P than treatments which received higher levels of irrigation. Weed growth was most vigorous on the plot receiving 1 in. every 2 weeks. Late blight incidence was serious with the heaviest irrigation (1 in. 3 times a week). Yields increased with irrigation to a maximum at 1·6 in. per week, but at 3 in. per week yields were reduced as a result of N leaching. When the soil was allowed to become dry, 2 inches of water in 1 application was less beneficial than 2 applications of 1 inch. Yields were poor where plastic separated the top soil from the underlying rock.—Sub-trop. Exp. Stat., Homestead.

2676. Barbieri, R.
Esperienze sulla coltivazione del pomodoro in Sardegna. Varietà e sistemi di allevamento. (**Experiments in tomato growing in Sardinia. Varieties and systems of training**
Studi sassaresi, Sez. III, 1953, **1**: 185-201, bibl. 1, illus. [received 1958].

Large-fruited varieties gave higher yields when staked, but for small-fruited varieties stakes were unnecessary The canning variety Lampadina gave its best results when grown with 4 plants to a pyramid of 4 stakes. The variety Reed Plum, grown for concentrates, was best unsupported. In the 5 varieties tested, fruit quality was not affected by support.

2677. Persson, A., and Rappaport, L.
Gibberellin-induced systemic fruit set in a male-sterile tomato.
Science, 1958, **127**: 816, bibl. 14.

The main stems of male-sterile tomato plants were pruned to stimulate growth of 2 similar lateral branches from the cotyledonary axils. Floral sprays of 500 µg. gibberellin per ml. resulted in characteristic parthenocarpic development [see also *H.A.*, 27: 3568]. The systemic effect of gibberellin was investigated by applying 100 µg. per plant to the first or second fully expanded leaf above the second open flower cluster, to stem apices or to the peduncle of a single inflorescence, or by applying 100 ml. of a solution containing 100 mg. gibberellin to the soil. Increased parthenocarpic fruit set was induced on both treated and untreated laterals by applying gibberellin to the foliage but not by treating peduncles. The greatest fruit set resulted from soil application. All treatments, in addition to floral sprays, resulted in significant increases in size of "dormant" fruits [see also *H.A.*, 27: 3569].—Univ. Calif., Davis.

2678. Rappaport, L.
Effect of gibberellin on growth, flowering and fruiting of the Earlypak tomato, *Lycopersicum esculentum.*
Plant Physiol., 1957, **32**: 440-4, bibl. 18, illus.

GA at 100 and 200 µg. per plant caused total stem elongation, but not at lower doses. Stem elongation in young plants was increased at all concentrations between 2 and 450 µg. per plant. Fresh weight and dry matter were also increased. Leaves were enlarged and had entire margins. Concentrations of 25 to 100 but not 200 µg. per plant hastened flowering by 3 to 6 days, and sprays of 1 to 500 µg./ml. increased setting of normal and parthenocarpic fruit. Fruit size was not increased.—Univ. Calif., Davis.

2679. Huang, H., and Hung, L.
The fruit quality of tomatoes as affected by para-chlorophenoxyacetic acid (PCA) for increasing fruit set during cool seasons.
[Chinese, with English summary 1 p.]
Mem. Coll. Agric. nat. Taiwan Univ., 1957, **4**(4): 27-45, bibl. 20, illus.

PCA sprays at 3 concentrations were applied to Pritchard tomato plants. The percentage of abnormal fruits was not increased by PCA. Sprays increased the percentage of green locule, the greatest amount being found in the earliest picks and with 30 p.p.m. PCA. The number of puffy fruits was not increased by PCA, but the degree of puffiness per fruit was increased in proportion to the concentration of the spray. [See also *H.A.*, 27: 3570.]

2680. Weinmann, W.
Untersuchungen über den Einfluss einer Wuchsstoffbehandlung von Tomatenpflanzen auf den ernährungsphysiologischen Wert der Früchte. (**Studies on the effect of growth substance treatment of tomato plants on the nutritional value of the fruits.**)
[English summary 12 lines.]
Maveg., 1957, **2**: 342-9, bibl. 6.

The addition to their diet of a press-juice concentrate from tomato fruits previously treated with growth substances increased mortality in rats, though not significantly, and decreased the weight of certain organs, as compared with animals to whose food the press-juice of untreated tomatoes had been added. The composition of the concentrate from treated and untreated fruits is tabulated.—Bundesanst. Qualitätsforsch. pflanzl. Erzeugn., Geisenheim.

2681. Wu, M.
The flavonoids of the tomato (*Lycopersicon esculentum*).
Diss. Abstr., 1957, **17**: 2147-8, being *Publ.* 22,830 of 176 pp.

WU, M., AND BURRELL, R. C.
Flavonoid pigments of the tomato (*Lycopersicon esculentum*).
Arch. Biochem. Biophys., 1958, **74**: 114-18, bibl. 7.

The flavonoids present in skins of Ponderosa, Sunny Ray and Rutgers tomatoes were naringenin and quercitrin. No flavonoids were found in the flesh of these varieties. Leaf samples contained both rutin and quercitrin, except in Rutgers which lacked rutin.—Ohio St. Univ.

2682. GEISSLER, T.
Bodendämpfung und Stickstoffdüngung zur Gewächshaustomate, die im Fruchtwechsel mit der Treibgurke steht. **(Soil steaming and nitrogen manuring for glasshouse tomatoes, grown in rotation with cucumbers.)**
Dtsch. Gartenb., 1958, **5**: 7-8, bibl. 2.

The effect of soil steaming with or without N, or with a straw amendment, has been studied in relation to yield and quality of an early and a late tomato crop, following a cucumber crop. Soil steaming in general increased yields, but the effect was reduced by straw, and also by N manuring, particularly with the later crop. Steaming also had a favourable effect on quality. Yields from crops given N manuring were later than from those without N. In general profits were increased by steaming and reduced N manuring.—Inst. Gartenb., Grossbeeren.

2683. STANTON, D. J., AND WOODS, G. F.
Influence of sawdust and nitrogen on outdoor tomatoes.
A.R. Cawthron Inst., 1956-1957, 1957, pp. 46-9.

Tomatoes were grown for 6 successive years on plots receiving 3 levels of N, with or without pine sawdust mulching. Sawdust had a detrimental effect in the first 3 seasons, but later, as it improved soil structure, yields were higher and quality was equal to or better than that from comparable non-sawdust plots. On non-sawdust plots N levels did not appreciably affect yields, but increasing the N levels from 667 to 1,334 lb. greatly improved quality. On sawdust plots during the period of sawdust decomposition yields and quality improved with N application, but after decomposition yields were not affected, although quality improved. There was a slight tendency for blossom-end rot to increase with increasing N levels.

2684. VAN KOOT, Y.
Toediening van meststoffen in opgeloste toestand. **(Nutrient application in soluble form.)**
Stikstof, 1958, No. **17**, pp. 159-63, illus.

The uses of fertilizer solutions during the early stages of tomato growth are described. Phosphorus uptake by tomato seedlings is related to soil temperature, and the high P requirements are most easily met by P in a soluble form. Symptoms of P deficiency in tomato seedlings may be corrected by immersing the pots in warm water (±40° C.) in which 2% mono-ammonium phosphate is dissolved. After a period of supplementary lighting sugar sprays have increased yields, but fruit ripening was delayed. The addition of urea to the sugar spray corrected this effect.

2685. HÅRDH, J. E.
Tomaatintaimien fosforin- ja typentarpeesta. **(Phosphorus and nitrogen requirements of young tomato plants.)** [English summary 1 p.]
Valt. Maatalousk. Julk. **162**, 1957, pp. 18, bibl. 13, illus.

Ammonium phosphate, labelled with P^{32}, was applied to young tomato plants. Phosphorus uptake was stimulated by artificial illumination. Ammonium N in the pricking out soil reduced P uptake during the first 7 days and lessened the effect of light. Increased soil conductivity did not affect P uptake. Plant growth was affected mainly by Ca content and conductivity of the soil, and was not related to P uptake. Plant uptake of P was higher from a solution than from dry fertilizer, but growth differences as affected by method of fertilizer application were only apparent at low soil temperature (8–10° C.). A starter solution (11 : 32 : 14) increased early and total yields in years when a period of cold weather followed transplanting. In a water culture test growth was best in a solution containing nitrate N; plants in an ammonium N solution showed N deficiency symptoms and poor growth.—Agric. Res. Centre, Dep. Hort., Piikkiö, Finland.

2686. MACKOV, F. F., AND IKONENKO, T. K.
The relationship between foliar nutrition, photosynthesis and root nutrition of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1958, **118**: 601-3, bibl. 20.

Tomato plants grown in a nutrient solution with P^{32} when sprayed with 1% urea showed a much higher P uptake than similar unsprayed plants. After harvest the N content of the sprayed plants was found to be higher, and spraying also increased photosynthetic activity.

2687. MASSEY, P. H., JR., RICH, C. I., AND CAMPER, H. M.
Radioactive superphosphate applied to tomatoes.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 221-2.

Plant uptake of P was higher from deep furrow placement than from shallow band placement. A high rate of superphosphate significantly increased the yield of U.S. No. 2 tomatoes, compared with a low rate of superphosphate.

2688. PETROČENKO, U. A.
Introduction of stimulants and nutrients into tomatoes by vacuum-infiltration. [Russian.]
Bjul. Gl. botan. Sada AN SSSR, 1956, No. 26, pp. 93-5, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,438.

Succinic acid at 0·001 and 0·0002 M and urea at 0·5%, urea at 0·5% + KH_2PO_4 at 0·5% and KH_2PO_4 at 0·5% were applied to tomato seedlings, variety Break o'day, by vacuum-infiltration before transplanting. As controls either untreated plants or plants infiltrated with distilled water were used. Succinic acid at 0·001 M increased yields by 22·0% and at 0·0002 M by 26·3%. Urea increased yields by 23·9% and KH_2PO_4 by 12·5%, but the mixture of the two compounds caused a 10·3% reduction.

689. BRADLEY, D. B.
A study of tomato acidity and its relationship to acid constituents and mineral nutrition.
Diss. Abstr., 1957, **17**: 2369, being *Publ.* 22,505 of 124 pp.

A quantitative procedure for the separation of organic and inorganic acid anions in the purée of tomato fruit was developed using ion exchange and silica gel partition chromatographic techniques. In field plot studies it was shown that increasing rates of K fertilization produced increases of up to 40% in the titratable acidity level and citric acid content of the Improved Garden State Variety. Increases in titratable and total acidity levels were accompanied by substantial increases in K contents of fruit and plant. Increasing rates of K fertilization in many cases produced significant increases in yield. Various levels of Ca and Mg fertilization produced no significant differences in yields or acidity levels of the fruit except that, as Ca levels increased, malic acid contents decreased.—Rutgers Univ.

690. SEATZ, L. F., STERGES, A. J., AND KRAMER, J. C.
Anion effects on plant growth and anion composition.
Proc. Soil Sci. Soc. Amer., 1958, **22**: 149-52, bibl. 11.

Yields of dry matter and contents of P, Cl and S are given for tomato plants grown in silt-loam fertilized at 4 different rates of either Cl or SO_4 and 2 different rates of both lime and P, with no variation in N or K applications. Dry matter yield was higher from SO_4 than from Cl, the only significant effect of anion rate being a marked reduction at the highest Cl level, i.e. 11·28 lb.-equivalents per 2 million lb. of soil. In both SO_4 and Cl series the yield was increased by added lime and was significantly higher with 160 than with 80 lb. of P_2O_5 per acre. Plant P was depressed at the highest SO_4 rate, but increased at the highest Cl rate. Plant Cl, as would be expected, rose with the increase in Cl application, but was little affected by SO_4 level. In the Cl series it was depressed by liming and in the SO_4 series by increasing the P application. Uptake of S increased with S supply and with liming in the SO_4 series, but in the Cl series it fell with increasing P application. In a somewhat similar experiment involving Cl, SO_4 and CO_3 treatments, tomatoes grown after maize failed to utilize P satisfactorily.—Tenn. agric. Exp. Stat., Knoxville.

2691. MEDERSKI, H. J., AND VOLK, G. W.
Results of studies on sterilization injury of greenhouse tomatoes.
Ohio Fm Home Res., 1958, **43**: 8-9, illus.

Steam sterilization of greenhouse soil can release manganese in toxic quantities causing leaf necrosis and curl. It is most likely to occur with acid soils rich in Mn. Liming acid soils and maintaining a higher greenhouse temperature, so that growth is more rapid, reduces the extent of sterilization injury.

2692. KIDSON, E. B.
Water culture experiments on nutritional problems of the tomato.
A.R. Cawthron Inst. 1956-1957, 1957, pp. 41-2, illus.

In water culture studies Zn deficiency symptoms were corrected by adding 0·01 p.p.m. Zn before the start of fruit ripening. When fruit was ripened under conditions inducing cloud there was an indication that application of 0·05 p.p.m. Zn was associated with increased severity of cloud symptoms. Partial shading of the plants for 3 weeks resulted in lower contents of dry matter in leaves and fruits, and higher N contents (on a dry matter basis) of fruits, leaves and top growth.

2693. WHATLEY, B. T.
Studies on tomato fruit cracking.
Diss. Abstr., 1957, **17**: 2373, being *Publ.* 22,560 of 66 pp.

During ripening of tomato fruits Ca and B contents decreased, while K content remained relatively constant. In ripe fruits there was a positive correlation between Ca and B, and Ca was negatively correlated with radial cracking. The degree of radial cracking and K content of ripe Queens fruit were positively correlated. An interaction between irrigation and variety had a significant effect on Ca content of ripe fruit. The interaction of variety, irrigation and borax fertilization affected B contents of ripe fruit. The osmotic value of expressed juice increased more than 20% during the ripening process from the mature-green to the red-ripe stage. A hypothesis to account for radial cracking in tomato is proposed.—Rutgers Univ.

2694. PROCTOR, C. H.
High humidity major factor in blotchy ripening in glasshouse tomatoes.
N.Z. Comm. Gr, 1958, **13**(9): 3.

In a glasshouse trial severe blotchy ripening in Potentate tomatoes was induced by conditions of high humidity when associated with high levels of watering. There was an indication that other factors involved include low light intensity, high temperatures and infection with tobacco mosaic.—D.S.I.R., Auckland.

2695. HÅRDH, J. E.
Om topprötans fysiologiska bakgrund hos tomat. (**The physiological background of blossom-end rot of tomato.**) [English summary 1 p.]
Reprinted from *Nord. JordbrForskn.*, 1957, **39**: 432-48, bibl. 23, illus.

The symptoms and causes of blossom-end rot are discussed. Injections of solutions of succinic, malonic and oxalic acids into unripe tomato fruits induced internal cavities with a brown wall, but no large necrotic areas. Potted plants of Potentate showed an increase in the percentage of blossom-end rot with increasing soil conductivity. Analyses of unripe fruits showed an increase in malonic acid with increasing soil conductivity, but total acidity of the fruits and plant sap was not affected. In affected fruits the malonic acid content of the pericarp was higher than that of the pulp, but contents were equal in healthy fruits. It is suggested that the initial cause of blossom-end rot is a change in enzyme activity due to an abnormal increase in soil and plant sap concentration, which results in a higher rate of malonic acid synthesis than breakdown. Malonic acid decreases the respiratory quotient of plant cells and may decompose the calcium pectate of the middle lamellas.—Hortic. Res. Inst., Piikkiö, Finland.

2696. Tolba, M. K., and Saleh, A. M.
Studies on the physiology of host-parasite relations. VI. Physiological analysis of the susceptibility of three tomato varieties growing in Egypt to attack by *Fusarium culmorum* and *Fusarium oxysporum*.
Bull. Inst. Egypte, 1955, **36**(1): 205-20, from *Bull. sci. tech. Docum. Centre, Cairo*, 1956, Vol. **2**, Abstr. 101,092.

Variations in susceptibility of green and red fruits of the 3 varieties appeared to be correlated with: (*a*) pH of the tomato tissue; (*b*) contents of reducing sugars and amino-N; and (*c*) the presence or absence of thermolabile inhibiting substances in the tissue.

2697. Kalyanasundaram, R.
Production of fusaric acid by *Fusarium lycopersici* Sacc. in the rhizosphere of tomato plants.
Phytopath. Z., 1958, **32**: 25-34, bibl. 13, illus.

Fusaric acid is fairly stable in buffer solutions of pH 3 to 8 for a period of 20 days incubation at 20° C. Fusaric acid was inactivated in soil but was not inactivated in acid-washed sand, fresh or sterile. The analysis of tomato root exudates showed the presence of many amino acids, glucose and certain other reducing substances. It was possible to detect approximately 7·5 μg. and 11·25 μg. of fusaric acid per plant in the sand and soil rhizosphere respectively of 20-days-old Tuckswood tomato plants infected with *Fusarium lycopersici*. It was also possible to show that an antibiotic like fusaric acid could be synthesized in natural soils if there are favourable microhabitats. [From author's summary.]—Dep. spec. Bot., Swiss fed. Inst. Technol., Zürich.

2698. Gäumann, E., and others.
Der Einfluss der Fusarinsäure auf den Wasserhaushalt abgeschnittener Tomatensprosse. (**The effect of fusaric acid on water relations of detached tomato shoots.**) [English summary ¾ p.]
Phytopath. Z., 1958, **32**: 225-44, bibl. 13, illus.

High dosages of fusaric acid (100–100 mg. per kg. fresh weight during the first hour of the experiment) paralysed water exchange, which was reduced by half within 3–5 hours. Low dosages of fusaric acid (20 mg. per kg. fresh weight) induced an initial increase in rate of water exchange, followed by a reduced rate. With the appearance of necroses the rate of water exchange was further reduced, but more slowly than before. Water uptake was much lower than transpiration, thus shoots lost first their moisture and then their turgor.—Inst. spez. Bot., Eidg. tech. Hochschule, Zürich.

2699. Wiggell, D.
Tomato leaf mould: spraying trials in Lancashire and Yorkshire, 1953-56.
Plant Path., 1958, **7**: 26-9.

Captan, zineb, thiram and manam controlled moderate attacks of leaf mould (*Cladosporium fulvum*), but left a deposit on the fruit. Salicylanilide and colloidal copper with water were safe general sprays, but both gave poor control of severe attacks. Nabam plus zinc sulphate (22·7% Zn) gave consistently good results against severe attacks, and was only phytotoxic in bright sunshine.—N.A.A.S., Leeds.

2700. Wilson, J. D.
Tomato sprays must be properly applied and timed for best results.
Ohio Fm Home Res., 1956, **41**: 55-6, 62-3, illus.

Of 8 fungicides tested over 3 seasons against tomato anthracnose, maneb wettable powder, 2 : 100, gave the best results together with good control of foliage diseases, followed by maneb plus ziram, 1 : 1 : 100. Ziram controlled anthracnose but was less effective against early blight.

2701. Wingard, S. A., Spasoff, L., and Henderson, R. G.
Dust fungicides for tomato disease control.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, p. 222.

Copper and organic fungicides were applied as dusts to Rutgers tomatoes at intervals of 7, 10 and 14 days for the control of early blight and leaf spot. The fungicides did not remain effective against these diseases for longer than 7–10 days. The copper fungicides had a longer residual life than the organics maneb, zineb and captan; maneb was the most persistent of the organic fungicides.

2702. Grossmann, F.
Untersuchungen über die innertherapeutische Wirkung organischer Fungizide. I. Thiocarbamate und Thiurame. (**Studies on the internal chemotherapeutic effect of organic fungicides. I. Thiocarbamate and thiuram.**) [English summary ½ p.]
Z. PflKrankh., 1957, **64**: 718-28, bibl. 30.

Development of fusarium wilt in tomatoes (*Fusarium oxysporum* f. *lycopersici*) was inhibited by pre-infection treatment with dimethyldithiocarbamate compounds, but these had a phytotoxic effect. Ethylenebisdithiocarbamates, which were not or only slightly phytotoxic, were not effective as chemotherapeutants. Post-infection treatments with dimethyldithiocarbamates were not effective. Infection by *Alternaria solani* was not inhibited by the organic fungicides tested; most compounds significantly decreased the rate of infection by *Phytophthora infestans*. No evidence for systemic fungitoxicity has been obtained, and it is suggested that the chemotherapeutic effects observed are due to changes in host metabolism.

2703. Burgis, D. S., and Overman, A. J.
Chemicals which act as combination herbicides, nematodes and soil fungicides: I. Effect on field-seeded tomatoes.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 137-9, bibl. 13.

Pre-planting autumn applications of Vapam (50 lb. per 9,600 feet of row), Mylone (50 lb.), allyl alcohol (AA) plus DD (7+7 gal.), MR 3908 (7 gal.), AA (7 gal.), and AA plus VC13 (7+7 gal.) gave a high degree of weed control in plots of seeded tomatoes. All chemical treatments significantly increased numbers and weights of marketable fruits; the highest amount of marketable fruit was produced after Vapam, Mylone and drenches of MR 3908 and AA significantly reduced weed populations, and marketable yields were improved by all chemical treatments. EDB and DD mixtures with AA gave some control of southern blight fungus (*Pellicularia rolfsii*).—Gulf Coast Exp. Stat., Bradenton.

2704. Overman, A. J., and Burgis, D. S.
Chemicals which act as combination herbicides, nematocides and soil fungicides: II. Effect on soil microorganisms.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 139-43, bibl. 4.

The effectiveness of the soil fumigant treatments applied in paper I [see preceding abstract] were evaluated. Treatments giving the best herbicide-nematocide-fungicide effects produced the highest yields, namely EDB-(W85), Vapam-4S and AA plus EDB. Applications of MR 3908 and AA in the autumn, when nematode damage was low, also produced high yields.—Gulf Coast Exp. Stat., Bradenton.

2705. Giles, J. E., and Hutton, E. M.
Combining resistance to the root-knot nematode, *Meloidogyne javanica* (Treub) Chitwood, and fusarium wilt in hybrid tomatoes.
Aust. J. agric. Res., 1958, **9**: 182-92, bibl. 14, illus.

Tomato hybrids bred in Hawaii for resistance to *Meloidogyne incognita* proved to be resistant also to *M. javanica*, dominant in subtropical areas of Australia, and to a range of isolates of *Fusarium bulbigenum* var. *lycopersici*. This paper describes hybridization of these lines with commercial varieties. Wilt resistance appeared to be dominant in crossbred progenies, but nematode resistance inheritance was irregular. Yielding ability and good agronomic characters were achieved in the hybrids, but it is recommended that crop rotation will be necessary to prevent the selection of further nematode strains capable of severe infection. —C.S.I.R.O., Merbein and Brisbane. [See also *H.A.*, 27: 3599.]

2706. van den Brande, J., and Gillard, A.
Versuch zur Züchtung nematodenfreier Pflanzen auf mit Wurzelgallenälchen (*Meloidogyne hapla* Chitwood) verseuchtem Boden durch Regulierung ökologischer Faktoren (Ökologischer Pflanzenschutz). **(Studies on growing nematode-free plants on nematode-infested soil by regulating environmental factors.)** [English summary ¾ p.]
Nematologica, 1957, **2**: 398S-404S, bibl. 3, illus.

Tomato plants were grown in root-knot-infested soil in daylight at 20° C. or 15° C., or under artificial light for 20 hours a day at just below 15° C. Examinations at 6 and 10 weeks revealed the best development in illuminated plants, which had the highest dry weights of roots and tops. Gall number per plant was much lower on plants in artificial light than on those in daylight at 20° C. At the time of the 2 examinations over 90% of the root-knot nematodes were checked in their development by low temperature conditions.—Rijkslandbouwhogeschool, Gent.

2707. Lordello, L. G. E.
Experimentos com os nematicidas D.D., E.D.B. e brometo de metilo no combate aos nematódeos causadores de galhas em raízes de plantas (*Meloidogyne* spp.). **(Experiments with the nematocides D.D., E.D.B. and methyl bromide for control of nematodes (*Meloidogyne* spp.) in the roots of plants.)** [English summary 1 p.]
An. Esc. sup. Agric. Queiroz, 1955/66, **12/13**: 167-77, bibl. 11, illus. [received 1958].

Neither DD, ethylene dibromide nor methyl bromide at standard rates gave complete control of nematodes in tomato root galls after 5–30 days of rotting in the soil, but, unless thick woody roots are present, soil fumigation with any of the substances should be economic for practical purposes.

2708. Shearer, T. M.
Chloropicrin effects on tomato growth.
Grower, 1958, **49**: 623-5.

Soil sterilization trials with chloropicrin at 34 gal. per acre have shown that with tomato plants a slight initial check has been followed by healthy root development and vigorous growth. No effect on flavour was apparent.—E. Scot. Coll. Agric., Edinburgh.

2709. Wilson, J. D., Hedden, O. K., and Reimer, C. A.
Field application of chloropicrin for control of soil-borne pests.
Down to Earth, 1958, **13**(4): 13-16, illus.

A machine for chloropicrin application is described which has been successfully used in several field tests. In a test with eggplants grown in verticillium-infected soil plant loss was reduced from 26·4% to 0·5% after chloropicrin fumigation, and yields were more than trebled.

2710. Burton, C. L., and deZeeuw, D. J.
Studies on transmission of verticillium wilt of eggplant in Michigan.
Plant Dis. Reptr, 1958, **42**: 427-36, bibl. 17, illus.

Results of laboratory, greenhouse and field tests indicate that seed transmission of *Verticillium* wilt of eggplant is unlikely to occur in practice. Various cultural practices to minimize loss by *Verticillium* infection are discussed.—Dep. Bot. Plant Path., Mich. St. Univ.

2711. Pénzes, I.
Adatok a szegedi füszerpaprika gazdaságföldrajzához. A paprika éghajlati igényei. **(Data on the economic geography of pepper. Climatic requirements of pepper.)** [Russian and German summaries.]
Földrajzi Ért., 1956, **5**(4): 435-55, bibl. 25, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,418.

The history of capsicum growing in Hungary is described. From long term studies in the Szeged region it was established that optimum conditions for growth appear to be an average air temperature of <17° C. and soil temperature of <10° C. High light intensities increased yields and the amount of capsicine in the fruits. High rainfall increased yields but reduced the capsicin content and delayed fruit colouring.

2712. Crossan, D. F., and Rahn, E. M.
The development and evaluation of resistant pepper varieties and selections by means of artificial inoculation in the field with tobacco mosaic virus.
Plant Dis. Reptr, 1958, **42**: 48-50, bibl. 4.

Three pepper varieties or selections, resistant to tobacco mosaic virus, were considered superior to California Wonder in yield, plant uniformity, fruit shape and wall thickness.—Univ. Delaware.

2713. Revilla, V. A., and Corrales M., A.
Ensayo comparativo de resistencia al wilt del ají. **(Comparative trials of wilt resistance in red pepper.)**
Inf. mens. La Molina, 1957, **31**(362): 10-13.

Yield and percentage of wilt (*Fusarium annuum*) attack are recorded for 9 varieties over 3 successive years. The mean interval between sowing and harvesting is given for each variety. Nematodes were successfully controlled by spraying with Folidol (parathion)+DDT.

2714. Feldheim, W.
Vitamin E content of paprika fruits. II.
Z. Lebensmitt. Untersuch., 1957, **106**: 116–18, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-87.

Tocopherol contents (μg./100 g.) of fruits of 9 varieties of paprika were 25–160 for unripe, and 230–1,040 for ripe specimens. The oil content of the fruits and the unsaponifiable content of the oil increased on ripening.

Sundry.

(*See also* 2716f.)

2715. Gurgel, J. T. A., and Mitidieri, J.
Estudos sôbre o quiabeiro (*Hibiscus esculentus* L.). I. Pesquisas básicas. **(Studies on okra (*Hibiscus esculentus*). I. General information.)** [English summary ½ p.]
Rev. Agric. Piracicaba, 1954, **29**: 239-52, bibl. 13, illus.
II. Efeitos da autofecundação e do cruzamento. **(Effects of self- and cross-pollination.)** [English summary 1 p.]
An. Esc. sup. Agric. Queiroz, 1955/56, **12/13**: 37-51, bibl. 5, illus. [received 1958].

Part I is concerned with varieties, cultivation, harvesting, composition, uses, seed production and pest control. Part II shows that inbreeding did not reduce yields.

Noted.

2716.

a Abbot, M. T. J., Grove, J. F., and McCloskey, P.
Some constituents of the broad bean.
J. chem. Soc. Lond., 1958, pp. 1699-1701, bibl. 5.
Kaempferol in the shoots and fumaric acid and betulin in the roots.

b Acosta, J. C., Dimas, A., and Cadiz, T. G.
Comparative studies of cabbage varieties in Nueva Ecija, Mountain Province, and Laguna.
Philipp. Agric., 1957, **41**: 392-401, bibl. 7, illus.
Variety trials in the Philippines.

c Allerton, F. W.
Polythene in mushroom growing.
Bull. Mushroom Gr. Ass., 1958, No. 100, pp. 109-11.
For lining houses, shelves and trays, windscreens and heating pipes.

d Banga, O. (Editor].
10e beschrijvende rassenlijst voor groentegewassen [inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden]. **(10th descriptive variety list of vegetable crops [including early potatoes, strawberries, tobacco, medicinal and aromatic herbs].)**
[Publ.] Inst. Vered. Tuinbouwgew. Wageningen, 1958, pp. 163, illus., fl. 2.00.

e Blumenthal-Goldschmidt, S.
Some further investigations on the growth active substances extractable from dry lettuce seeds.
Bull. Res. Coun. Israel, Sect. D, 1958, **6**: 91-8, bibl. 9.

f Boss, M. L., and Ochse, J. J.
Commercial potential of *Yucca elephantipes*.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 302-3, bibl. 2.
The leaves were a rich source of vitamin C.

g Boswell, V. R.
Vegetables.
Yearb. Agric. U.S. Dep. Agric., 1957, pp. 692-8.
Soil requirements for temperate and subtropical species.

h Brien, R. M., and others.
Diseases and pests of lettuce in New Zealand and their control.
Inf. Ser. D.S.I.R. N.Z., **14**, 1957, pp. 38, illus.

i Campbell, J. S.
Commercial tomato growing in the West Indies.
World Crops, 1958, **10**: 165-8, bibl. 8, illus.
Varieties, cultural operations, production and trade.

j Chowdhury, D. K., and Bagchi, R.
Composition of the seed fat of *Cucumis melo*.
Naturwissenschaften, 1956, **43**: 350-1, bibl. 3 [received 1958].
Ripe melon seeds.

k Coleman, B. P., and Gillard, S. O.
Growing early cucumbers.
N.Z. J. Agric., 1958, **96**: 281-9, illus.
Cultural and disease control instructions.

l COOKE, G. W.
The value of fertilizer placement.
J. roy. agric. Soc., 1957, **118**: 37-49, bibl. 16.
A review, including recommendations for vegetables.

m EL-RIDI, M. S., AND OTHERS.
Determination of vitamin C content in the fruits of some pepper varieties at different stages of maturity.
Bull. Fac. Agric. Cairo Univ., 1956, No. 70, pp. 3-17, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,307.
The percentage of ascorbic acid increased during development in all varieties tested.

n FAJARDO, P. S.
A preliminary study on the effect of topping eggplant.
Philipp. Agric., 1955, **38**: 645-7 [received 1958].
No increase in yield, but topped plants less affected by bacterial wilt.

o FAVILLI, R.
La coltivazione del carciofo. **(Growing globe artichokes.)** [English, French and German summaries 2 lines each.]
Frutticoltura, 1958, **20**: 25-7, illus.
Including anti-frost sprinkling.

p FODA, Y. H.
Pectic changes during ripening as related to flesh firmness in the tomato.
Diss. Abstr., 1957, **17**: 2405, being *Publ.* 23,324 of 73 pp.

q GAUDINEAU, M., AND LAFON, R.
Sur la maladie à sclérotes du topinambour. **(*Sclerotinia* disease of Jerusaelm artichoke.)**
C.R. Acad. Agric. Fr., 1958, **44**: 177-8.
Resistant varieties are V 71, D 1, D 2 and Patate Vilmorin.

r HALL, C. B.
Composition and organoleptic evaluation of portions of celery stalks.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 204-8, bibl. 3.
Differences in outer and inner petioles, and portions of petioles.

s HEYDEMAN, M. T.
***Iso*citritase in germinating marrow seeds.**
Nature, 1958, **181**: 627-8, bibl. 7.
Operative in the conversion of fat to carbohydrate.

t HOOVER, M. W., AND DENNISON, R. A.
Preliminary studies of the utilization of cull tomatoes.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 211-14, bibl. 2.
As cattle feed.

u HOWARD, F. D., AND YAMAGUCHI, M.
Respiration and the oxidative activity of particulate fractions from developing pepper fruits (*Capsicum annuum* L.).
Plant Physiol., 1957, **32**: 418-23, bibl. 14.
Those from mature fruits oxidized various Krebs cycle intermediates and responded to additional cofactors, but those from immature fruits did not.

v HOWARD, F. D., AND YAMAGUCHI, M.
Hydrogen transport and oxidative phosphorylation by particulates from developing pepper fruits.
Plant Physiol., 1957, **32**: 424-8, bibl. 18.
No oxidative phosphorylation was observed in immature fruit, thus reflecting reduced dehydrogenase activity.

w HUGHES, D. H.
Discolouration findings noted—longer shelf-life is the goal.
Mushroom News, January 1958, reprinted in *Bull. Mushroom Grs' Ass.*, 1958, No. 99, pp. 86-92, illus.
Chemical treatments to delay browning of harvested mushrooms.—Univ. Delaware.

x HUSAIN, A., AND KELMAN, A.
Relation of slime production to mechanism of wilting and pathogenicity of *Pseudomonas solanacearum*.
Phytopathology, 1958, **48**: 155-65, bibl. 29, illus.

y HUYSKES, J. A.
Het kweken van zwaardere glasslarassen. **(Breeding glasshouse lettuce varieties with larger heads.)** [English summary 21 lines.]
Meded. Dir. Tuinb., 1958, **21**: 210-13, bibl. 14, illus.

z JENSEN, J.
Stammeforsøg med holdbar vinterhvidkål. 1954-57. **(Trials with cabbage varieties suitable for consumption in winter and spring.)** [English summary ½ p.]
Tidsskr. Planteavl., 1958, **61**: 905-18.

2717.

a JONES, H. A., AND SLEESMAN, J. P.
Onion hybrids offer increased yields and greater uniformity.
Ohio Fm Home Res., 1956, **41**: 60-2, illus.
Hybridization technique and notes on promising new varieties.

b KAWAMURA, S., AND OTHERS.
Studoj pri la karbohidratoj de la semo de *Vicia faba*. IV. Eltrovo de ribozo en hidrolizato de hemicelulozo de faboj. **(Studies on the carbohydrates of *Vicia* seeds. IV. IV. Determination of ribose and hydrolysed hemicellulose in beans.)** [English and Japanese summaries 1 p. each.]
Tech. Bull. Kagawa agric. Coll., 1957, **8**: 201-11, bibl. 24.

c LAMBERT, E. B.
Ventilation requirements for cultivated mushrooms.
Bull. Mushroom Grs' Ass., 1958, No. 99, pp. 70-3, bibl. 10.
10 cu. ft. of fresh air per hour per sq. ft. of bed is required.

d LANGE, W. H., AND BACON, O. G.
Crown mite damage on spinach.
Calif. Agric., 1958, **12**(2): 9, 16, illus.
Parathion 2% dust at 40–50 lb./acre gave satisfactory control of *Tyrophagus dimidiatus*.

e LUTZ, J. A., JR.
Sulfur in precipitation and atmosphere of Virginia and crop response to sulfur fertilization.
Bull. Va agric. Exp. Stat. **482**, 1957, pp. 12, bibl. 6, illus.
No significant yield response of onions to S fertilization.

f LYALL, L. H.
La tomate Ferguson. **(The Ferguson tomato.)**
Research for Farmers, Autumn, 1957, translated in *Agriculture, Quebec*, 1957, **14**: 178, illus.
This new bush variety, resistant to blossom-end rot, cracking, yellowing and drought injury, yielded an average of 18 tons/acre in a 6 years' trial.

g MCALISTER, D. T.
Mushroom growing in the Coleraine area.
Mon. agric. Rep. Minist. Agric. Belfast, 1958, **32**: 326-30.

h MARSHALL, H. H.
Polyembryony in tomatoes.
Canad. J. Plant. Sci., 1958, **38**: 67-72, bibl. 6.

i MASSEY, P. H., JR., AND JUDKINS, W. P.
Tannery sludge waste toxic to certain vegetable crops.
Res. Rep. Va agric. Exp. Stat. 1953-57, 1957, p. 225.
When used as a mulch, the high B content was toxic to peas, snapbeans and cucumbers.

j MICHEL, B. E.
Growth responses of crucifers to indoleacetic acid and indoleacetonitrile.
Plant Physiol., 1957, **32**: 632-9, bibl. 21.
The 24-hour growth of cabbage, radish and turnip hypocotyl sections compared by means of *Avena* coleoptile. [A fuller account of work noted *H.A.*, 26: 58.]

k MIDDLETON, L. J.
Absorption and translocation of strontium and caesium by plants from foliar sprays.
Nature, 1958, **181**: 1300-1303, bibl. 10, illus.
Contamination by fission products; test plants included french bean, swede and cabbage.

l MINISTRY OF AGRICULTURE, LONDON.
Cabbage root fly.
Adv. Leafl. Minist. Agric. Lond. **18**, revised 1957, pp. 5, illus.

m MINISTRY OF AGRICULTURE, LONDON.
Turnip gall weevil.
Adv. Leafl. Minist. Agric. Lond. **196**, amended 1957, pp. 3, illus.
Control of *Ceuthorhynchus* spp.

n MINISTRY OF AGRICULTURE, LONDON.
Onion fly.
Adv. Leafl. Minist. Agric., Lond. **163**, revised 1958, pp. 3, illus.
Delia antiqua damage and control.

o MOURSI, M. A., AND TAYEL, M. A.
Relation of nitrogen and dusting with sulphur to the growth of squash and its parts.
Ann. agric. Sci., Cairo, 1956, **1**(1): 107-16, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,483.

p NAKAGAWA, H., KAMIMURA, S., AND SATO, I.
Ecological studies on the chinese cabbage. 1. Relation between the sowing time and the principal characteristics of spring sown chinese cabbage. [Japanese, with English summary ⅔ p.]
Reps Tohoku nat. agric. Exp. Stat., 1957, No. 11, pp. 59-73, bibl. 30.
Effect of sowing date on flowering, bolting, heading, seed yield and quality.

q NAKAGAWA, Y.
Bell pepper growing in Hawaii.
Ext. Circ. Univ. Hawaii **387**, 1957, pp. 8, bibl. 5.

r NAVIA, J. M., AND OTHERS.
Nutrient composition of Cuban foods. II. Foods of vegetable origin.
Food Res., 1957, **22**: 131-44, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2,510.
Including vegetables, citrus and other fruits. For part I see *H.A.*, 26: 1837v.

s VAN DER PAAUW, F.
Relations between the potash requirements of crops and meteorological conditions.
Plant and Soil, 1958, **9**: 254-68, bibl. 13.
No significant correlation found for beans between response to K and the number of rainless days during the growing period.

t PIERIS, S.
The celery fly.
Countryman, Nicosia, February, 1958, p. 7.
Acidia heraclei, controlled by 0·02% parathion spray or 1–1½% dust.

u REISENAUER, H. M.
Molybdenum for legumes in eastern Washington.
Stats Circ. Wash. agric. Exp. Stats **307**, 1957, pp. 6.
1 lb./acre sodium molybdate increased pea yields by 165 lb./acre by stimulating N-fixing organisms.

v REYNOLDS, J. D.
Variety trials with Dutch threshed peas.
Agriculture, Lond., 1958, **65**: 34-7, bibl. 7, illus.

w REYNOLDS, J. D.
Mechanization has changed the pea-growing scene.
Comm. Gr, 1958, No. 3244, pp. 499-504, illus.
Descriptions of new cutters, windrowers, loaders and viners.

x RIES, S. K.
The effect of spacing and supplemental fertilizer applications on the yield of pickling cucumbers.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 375-81, bibl. 2, illus.
Plants should be spaced 4 to 8 in. apart in rows 4 or 5 ft. apart.

y SAVIDGE, M.
New systemic insecticide for cabbage aphid [*Brevicoryne brassicae*] control.
Fruit World, Melbourne, 1958, **59**(3): 27.
Metasystox at 16 fl. oz. per acre.

z SIRRY, A. R., AND MOURSI, M. A.
The relation of nitrogen and dusting with sulphur to the spread of powdery mildew and yield of summer squash.
Ann. agric. Sci., Cairo, 1956, **1**(1): 313-16, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,490.
N increased yield; S reduced spread of mildew.

718.

a SIRRY, A. R.
The effect of plant nutrition and soil moisture on *Botrytis fabae* Sard. on broad beans at Shebin El-Kom, Egypt.
Ann. agric. Sci., Cairo, 1956, **1**(1): 319-24, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,504.
Rates of infection at various levels of N, P, K and soil water content.

b SKINNER, C. G., AND SHIVE, W.
Effect of some isomeric purine analogues on germination of lettuce seed.
Plant Physiol., 1957, **32**: 500-1, bibl. 3.

c SKINNER, C. G., AND SHIVE, W.
Synergistic effect of gibberellin and 6-(substituted)-purines on germination of lettuce seed.
Arch. Biochem. Biophys., 1958, **74**: 283-5, bibl. 6.
When pre-soaked in various combinations and allowed to germinate in the dark at 30° C.

d SLEESMAN, J. P.
New materials to control DDT-resistant cabbage worms and loopers.
Ohio Fm Home Res., 1957, **42**: 64-5, illus.
Phosdrin as effective as endrin but with less residue hazard.

e SPENDER, B.
Mittel zur Ertragsbeeinflussung in der frühen Tomatentreiberei. **(Means of influencing yields in early tomato crops.)**
Dtsch. Gartenb., 1958, **5**: 61-3, bibl. 16, illus.
By hormone sprays and an electric vibrator.

STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med sorter af tomater i vaeksthus 1955-56. **(Variety trials with glasshouse tomatoes 1955-56.)**
Tidsskr. Planteavl, 1958, **62**: 169-72.

g STERLING, C., AND SPIT, B. J.
Microfibrillar arrangement in developing fibers of asparagus.
Amer. J. Bot., 1957, **44**: 851-9, bibl. 42, illus.
Electron-optical studies using a metal shadow-carbon replica technique.

h WARID, W. A.
Preliminary studies on Egyptian onions. [In Arabic.]
El Felaha, 1956, **36**: 26-60, from *Bull. sci. tech. Docum. Centre, Cairo*, 1956, Vol. **2**, Abstr. 100,873.
Planting on ridges better than in beds; direct sowing better than transplanting.

i WARREN, G. F.
Growers solve fumigation equipment problem in Indiana.
Down to Earth, 1958, **13**(4): 12, illus.
A description is given of a 2-row soil fumigator unit, which can be used 7–10 days before transplanting melons.

j WEBSTER, A. B.
Vegetable variety trials at Auchincruive, 1957.
Res. Bull. W. Scot. agric. Coll. **23**, 1958, pp. 20.
With beetroot, brussels sprouts, carrots, cauliflowers, lettuces, onions and turnips.

k WELCH, J. E., GOTAN, S., AND ZINK, F. W.
Progress on breeding downy-mildew-resistant lettuce varieties.
[*Publ.*] *Univ. Calif. Dep. Veg. Crops*, March 1957, pp. 2.
Developing Great-Lakes-type varieties.

l WIEBE, J.
Greenhouse vegetable production in Ontario.
Bull. Ontario Dep. Agric. **526**, 1958, pp. 34, illus.
Of lettuces, cucumbers, tomatoes and radishes.

m YOUNG, H. W.
Inheritance of fruit cracking in a *Lycopersicon esculentum* cross.
Diss. Abstr., 1957, **17**: 2129, being *Publ.* 22,831 of 195 pp.
Including methods of selection for resistance to cracking.

n ZAUMEYER, W. J., CLORE, W. J., AND THOMAS, H. R.
Columbia Pinto, a new disease resistant dry bean.
Stats Circ. Wash. agric. Exp. Stats **310**, 1957, pp. 2, illus.

TOBACCO.

General.

(*See also* 2077, 2125, 2474-2476, 2780a, b, k, t, 3204, 3213.)

2719. Drenowatz, M. C.
The tobacco literature service at North Carolina State College. Author and subject indexes to volume 1 of *Tobacco Abstracts.*
Tobacco, N.Y., 1958, **146**(1): 20-3, (2): 20-4, (3): 22-5, (4): 20-3, (5): 20-3, (6): 22-5.
North Carolina Agricultural Experiment Station.
Tobacco Abstracts [*Tob. Abstr.*], 1957, Vol. **1**, Nos. 1 to 6, each about pp. 48 and containing about 150 abstracts and titles.

The first article describes a new journal, *Tobacco Abstracts*, which is being compiled by the Tobacco Literature Service at North Carolina State College. This is a joint undertaking of the N.C. Agricultural Experiment Station and the D. H. Hill Library. The author and subject indexes for the first volume are printed in instalments as above. In addition to the abstract journal photocopying and translation services have been established.

In the numbers of the journal so far seen it is stated that publication is at approximately monthly intervals, with a minimum of 10 numbers a year. The whole field of tobacco growing, manufacture and consumption would appear to be thoroughly covered.

2720. D.S.I.R., N.Z., and Cawthron Institute.
Tobacco research. Annual Report for 1956-57, [1957], pp. 2.

Seedling beds: Drenches of Vapam and allyl alcohol both gave satisfactory weed control; ferbam (2 lb. per 100 gal.) applied at 3 gal. per 100 sq. ft. of bed gave good control of damping-off. *Use of fertilizer:* Sodium molybdate applications resulted in very good quality leaf; foliar sprays of urea at 20 lb. per acre produced a rapid response in N-deficient crops. *Cultural experiments:* In a spacing trial higher yields were produced by 12-in. and 21-in. spacing within the row than by intermediate spacings, but quality increased as spacing became wider; in an irrigation experiment the lowest yield came from a treatment in which soil moisture was kept above 60% field capacity throughout the season; all other treatments were superior to no irrigation. *Varieties and plant breeding:* Vamorr 50 and Virginia 45, two mosaic-resistant varieties, gave average yields of good quality; resistance to black root-rot, mosaic and verticillium wilt is being tested. *Chemical control of laterals:* Oil emulsions and maleic hydrazide have given satisfactory control. *Disease investigations:* Excellent control of nematodes was obtained with chloropicrin and DD. *Chemical analysis:* At high levels of K supply sugars decreased at higher rates of P application; differences in N and sugar contents were small when 3 sources of N were compared; large differences in sugar and N contents have been found in varieties differing in resistance to black root-rot and mosaic. [See also *H.A.*, 28: 2041 and 3204.]

2721. Henderson, R. G., and others.
Tobacco.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 108-17, illus.

Most of the articles in this section of the report describe progress in breeding tobacco resistant to black shank, mosaic and root-rot, and root knot, and in testing varieties for yield and quality. [See also abstracts below.]

Breeding, varieties and pollination.

(*See also* 2780e, g, p, r.)

2722. Jakovuk, A. S.
Varietal changes and seed production in tobacco. [Russian.]
Agrobiologija, 1957, No. 6, pp. 57-60.
Psarev, G. M.
Scientific research at the All-Union Scientific-research Institute for Tobacco and Mahorka during the years of Soviet rule. [Russian.]
Tabak, 1957, **18**(3): 48-51, illus.

The 2 articles cover similar ground and include references to new varieties, evolved from crosses between *N. tabacum* and *N. glutinosa*, which show resistance to mosaic and powdery mildew.

2723. Ternovskij, M. F.
Vegetative hybridization of tobacco. [Russian.]
Sb. nauč.-issled. Rab. Vses. n.-i. In-t. Tabaka i Mahorki, 1956, No. 149, pp. 35-66, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,290.

Tobacco varieties susceptible to downy mildew and mosaic when in the cotyledonary stage were grafted onto immune varieties before and during anthesis. No direct effect of the rootstocks was noted in the scions. In the first seed generation the number of immune plants was low, ranging from 1·4 to 36·3%. In the succeeding generations immunity was dominant in most cases, though in some the number of immune plants dropped to 22%. The hereditary characteristics of vegetative hybrids are discussed, and 2 varieties, Immunnij 2999 and Ostrolist 3000, developed by vegetative hybridization are described.

2724. Sakai, K. I.
Studies on competition in plants. VI. Competition between autotetraploids and their diploid prototypes in *Nicotiana tabacum.*
Cytologia, 1956, **21**(2): 153-6, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 0896.

Studies were made on White Burley and Bright Yellow (diploids) and tetraploid plants artificially obtained from these cultivars. Plants from each of these types were grown either isolated, or mixed with plants of the other types. A statistical study of records of size, weight, number of flowers and leaves and flowering date showed that the diploids displayed a marked increase in these 5 factors when they were surrounded by tetraploids instead of diploids. Tetraploid plants were depressed when surrounded by diploids. It is inferred that homologous doubling of the chromosome series caused a reduction in competitive ability.

2725. KURDJUM, JE. L.
Some characteristics of the pollen of the genus *Nicotiana*. [Ukrainian, with Russian summary.]
Stud. nauk. Praci Kyjivs'k. Un-t, 1956, **20**: 79-87, bibl. 18, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,069.

Studies were made on the morphology, carotene and carotenoid contents and storage capacity of the pollen of 7 species and 4 varieties of *Nicotiana*, and also on the effects of volatile emanations from the flowers, stigma secretions and low temperature on pollen germination. The pollen of all the species and varieties studied kept its viability in ordinary storage for over 30 days. The best medium for germinating pollen appeared to be a 5–7% sugar solution with 1·5% agar. Germination was stimulated by sowing the pollen thickly and by including flowers in the medium. The maximum carotenoid content was found in the pollen of *N. rustica* var. Hmelevka. Keeping mature pollen of *N. affinis* for 7–11 days at −6° to −10° C. did not reduce viability. Data are given on the viability of pollen in relation to its age and to the position of flowers in the inflorescence.

Seed treatments.

(*See also* 2780n.)

2726. SCARASCIA, G. T.
Effetti morfologici e mutativi dell'invecchiamento del seme in *Nicotiana tabacum* L. (**Morphological and mutational effects of ageing on seed of *Nicotiana tabacum*.**) [English summary ½ p.]
Tabacco, 1957, **61**: 270-90, illus.

Seeds of 4 varieties of tobacco were stored from successive harvests and set to germinate simultaneously, the youngest being a few months old and the oldest (in one variety) over 5 years. Decrease in viability and increases in the number of chromosome mutations in root-tip cells and of growth abnormalities in seedlings were slight at first, but became very marked in the 3rd year and still more so in the 4th and 5th years.

2727. ČIRKOVSKIJ, V. I.
The role of seeds in the study of tobacco evolution. [Russian.]
Sb. nauč.-issled. Rab. Vses. n.-i. In-t Tabaka i Mahorki, 1956, No. 149, pp. 131-46, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,285.

Tobacco seed stored under ordinary conditions (at 13–25° C. and 60–75% relative humidity) was only able to become dormant during its first year. When, however, the seed was stored immediately after harvest at reduced temperatures and humidity, it became dormant each year at the same time (summer). The dormancy became deeper, the lower the temperature and the humidity and the more humid the region from which the variety originated. It is concluded that wild tobacco was evolved in a region of high humidity and that its ancestor may have been a perennial plant.

2728. ČIRKOVSKIJ, V. I.
The development of tobacco plants in relation to the age of seeds and some other factors. [Russian.]
Sb. nauč.-issled. Rab. Vses. n.-i. In-t Tabaka i Mahorki, 1956, No. 149, pp. 147-61, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,286.

Experiments with tobacco plants grown from stored seed have shown that the physiological changes in the embryo tissue due to ageing have a depressing effect on the plants, especially during the early stages of development. This depressing effect is exerted, however, not only by the age of the seed, but also by unfavourable conditions of storage, i.e. high temperature and humidity, which hasten the ageing of the embryo.

2729. FRIMMEL, F.
Nové cesty stimulace tabáku. (**New ways of tobacco stimulation.**) [Russian and German summaries.]
Pol'nohospodárstvo, 1956, **3**: 631-45, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,286.

Sap from the hypocotyl of tobacco plants or ground hypocotyl, mixed with dextrin and applied to tobacco seed, stimulated seedling growth and leaf elongation. The treatments did not, however, affect the final yield.

Soils, nutrition and irrigation.

(*See also* 2526, 2755, 2780j, l, v, w.)

2730. SEQUEIROS, J. M., GALBIS, J. A., AND OLIVER, J.
La influencia del medio sobre la composición mineral y otras cualidades de los tabacos españoles. 1. Tabacos cultivados en suelos no calizos del área extremeña (Zona 8ª). (**The influence of environment on mineral composition and other qualities in Spanish tobaccos. 1. Tobaccos grown on non-calcareous soils in Extremadura (Zone 8).**) [English summary ½ p.]
Bol. Inst. nac. Invest. agron. Madrid, 1957, **17**: 199-230, bibl. 29.

Detailed studies were made on burning quality and contents of Cl, N, P, K, Na, Ca and Mg in White Burley tobacco from soils of various geological origin. Mineral composition reflected the 5 main types of soil. Burning quality was good on granitic soil and in the Tiétar valley, moderate on eocenic and crystalline-stratum soils and poor on the alluvium of the Tagus valley, where the high Cl content (2·5%) of the leaves was attributed to unsuitable irrigation water. High quality was associated with high K_2O/Cl ratios and with high $K_2O/Cl(CaO+MgO)$ ratios, the optimal values in this investigation being 6·42 and 1·16 respectively.—Inst. Biol. Tabaco, Secc. Edaf., Sevilla.

2731. CIBES, H., AND SAMUELS, G.
Mineral-deficiency symptoms displayed by tobacco grown in the greenhouse under controlled conditions. [Spanish summary 2 pp.]
Tech. Pap. P.R. agric. Exp. Stat., Río Piedras **23**, 1957, pp. 22, bibl. 2, illus.

The cigar-filler variety Virginia 12 was grown in sand cultures with complete nutrient solutions and with solutions lacking N, P, K, Ca, Mg, S, Fe, B and Mn. The deficiency symptoms observed are described and illustrated in colour. Lack of any one of the elements reduced yields substantially. The greatest reductions in leaf weight occurred in the absence of N, P, K and S, but even the elements with the least effect, Fe and Mn, reduced leaf green weights by 46% or more. Lack of K reduced the leaf moisture content, but lack of S and Mn produced higher moisture contents than did the complete nutrient. Leaf analyses showed that omission of any of the elements had an effect on the leaf content of one or more of the other elements. Finally, the colour of the tobacco ash was influenced by deficiencies. Leaves from plants receiving no N, K or S produced a light to medium grey ash, whereas lack of P, Fe, Mg and Mn and the complete nutrient produced a dark grey ash, and lack of B and Ca a black ash.

2732. LaPrade, J. L., Henderson, R. G., and Matthews, E. M.
Fertilization of tobacco in rotations including lespedeza.
Matthews, E. M., Kroontje, W., and Henderson, R. G.
Fertilization with 1-10-8 best for bright tobacco in rotations including lespedeza.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 117-18.

In a 2-year rotation the N requirements of tobacco after lespedeza were dependent on the growth and density of the lespedeza stand. Following a good stand 10–20 lb. N per acre was required, while after a poor stand applications of 30 lb. N were necessary. In a 3-year rotation with corn as the third crop 30–35 lb. N per acre gave the best results. Increasing potash applications above 80 lb. K_2O per acre gave no significant yield increase in either the 2- or the 3-year rotations. Root rot troubles were more pronounced in the 2-year rotation than in the 3-year rotation. In 2-year rotations 1,000 lb. per acre of 1–10–8 fertilizer has given the best returns of bright tobacco.

2733. Ivanovskij, N. P.
The effect of new kinds of fertilizer on the yield and quality of tobacco. [Russian.]
Sb. nauč.-issled. Rab. Vses. n-i. In-t Tabaka i Mahorki, 1956, No. 149, pp. 190-207, from *Ref. Ž. (Biol.)*, 1957, No. 19, Abstr. 82,292.

Potassium-ammonium-phosphate, ammophos, potassium-magnesia and a triple mixture of standard fertilizer were compared for tobacco at 5 locations. It was found that potassium-ammonium-phosphate was more effective than the triple mixture. Potassium-magnesia surpassed potassium sulphate when the amount of Mg did not exceed 20–40 kg./ha. Ammophos gave results equal to those of the standard mixture. In all cases the amounts of the fertilizers applied were adjusted to provide the same amount of P, N and K fertilizers being added to make up deficiencies in their elements where necessary.

2734. Takahashi, T., and Yoshida, D.
The interrelationship between various ions in absorption by tobacco plants. I. Relationship between forms of nitrogen and cation levels in culture solutions.
Soil and Plant Food, 1956, **2**: 96-101, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 0888.

Tobacco plants grown in sand cultures received nitrogen either as nitric or as ammoniacal N. When N was supplied as nitrate N the Ca or K levels of the nutrient solution did not influence the N content of the plant; when N was ammoniacal the N content of plant increased when the Ca concentration of the solution increased, and decreased when the K concentration increased. NH_4-N reduced K absorption and delayed that of Ca, while NO_3-N increased K absorption and speeded up that of Ca. Mg and Mn absorption was greater in the presence of NO_3-N than in the presence of NH_4-N.

2735. Ramunni, A.
Nutrizione extra-radicale in piante di *Nicotiana tabacum*. Nota 1. Assorbimento di azota attraverso le foglie da soluzione di urea nebulizzata in piante di *Nicotiana tabacum*, cv. Round Tip, coltivate in terreno artificiale N-carente. **(Foliar nutrition of plants of *Nicotiana tabacum*. Note 1. Absorption of nitrogen via the leaves from solutions of urea sprayed on plants of the variety Round Tip, grown in artificially N-starved soil.** [English summary ¾ p.]
Tabacco, 1957, **61**: 291-306, bibl. 22, illus.

Tobacco seedlings were transferred to sand cultures with and without N. At the appearance of N-deficiency symptoms, half the deficient plants were sprayed at 3-day intervals with a urea product, a total of 15 g. of urea being supplied to 7 plants. Dry matter in the leaves, but not in the stems, was very significantly increased by spraying. It was, however, still far below the level in plants supplied with a complete nutrient solution. The foliar N contents of deficient, sprayed and adequately supplied plants were approximately in the proportions 1 : 2 : 4. The urea absorbed by the leaves appeared to be converted into protein. Spraying increased the nicotine content of N-deficient plants.

2736. Ramunni, A.
Nutrizione extra-radicale in piante di *Nicotiana tabacum*. Nota II. Assorbimento del fosforo da parte delle foglie di piante di *Nicotiana tabacum*, cultivar Round Tip. **(Foliar nutrition of plants of *Nicotiana tabacum*. Note II. Phosphorus absorption by leaves of *N. tabacum* var. Round Tip.)** [English summary ½ p.]
Tabacco, 1957, **61**: 480-9, bibl. 8, illus.

After growing for 1 month in P-deficient sand culture, half of the tobacco seedlings were sprayed with 2·5% potassium phosphate solution containing a spreader. A complete nutrient solution was supplied to the sand for control plants, and when these began flowering, leaves and stems from all the plants were analysed. The sprayed plants, all of which had flower buds, some opening, were smaller than the controls and some of their basal leaves were withered, but they appeared healthy. Their dry weight and P content were distinctly higher than in the unsprayed P-deficient plants. The K component of the phosphate may have enhanced the result. The nicotine content was positively correlated with the P status in the 3 treatments.

2737. Steinberg, R. A., and Jeffrey, R. N.
Comparison of pruning (topping, suckering) effects in normal and boron-deficient tobacco on relative growth and alkaloid content of leaf, stalk, and root.
Plant and Soil, 1957, **9**: 64-74, bibl. 6.

Connecticut Broadleaf tobacco plants were grown in spring and autumn in nutrient solutions, with and without B. Some were left unpruned, but others were topped at different heights as soon as B deficiency symptoms appeared in those grown without B. The plants were desuckered as necessary and harvested 0, 2, 4 or 6 weeks after topping. In general, the longer the period between topping and harvesting, the greater were both the fresh weight yield and alkaloid content. With adequate B, decreased height of topping generally resulted in increased alkaloid synthesis but had little effect on final yield. Low topping tended to increase leaf size. Topping and desuckering markedly increased alkaloid synthesis, root branching and the formation of fibrous roots, and increased translocation of alkaloid from roots to tops. The general trend in pruned and unpruned plants grown without B was similar to that of pruned plants grown with B, although growth was abnormal and less vigorous and alkaloid increase over the growing period less marked. The final alkaloid concentration in pruned plants, however, was higher in B-deficient than in normally fed samples. In B-deficient plants apical growth had almost ceased at the time of topping, and nicotine distributions between leaves and roots was not appreciably affected by topping.—Agric. Res. Serv., U.S.D.A., Beltsville, Md.

2738. Jones, J. N., Jr., Moody, J. E., and Lillard, J. H.
Corn and burley tobacco plot studies.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 52-3.

The possibility of restricting irrigation in tobacco to a critical growth period has been investigated. This period in tobacco begins when the plant is 18 in. high and continues up to and during flowering. No difference in yield or quality was observed between full-season irrigation and irrigation restricted to the critical growth period. Both irrigation treatments increased yields by about 350 lb. per acre, compared with no irrigation, but did not improve quality.

Chemicals to suppress suckers, etc.

(*See also* 2737.)

2739. Kurup, C. K. R., and others.
Suppression of suckers in cigar tobacco by vegetable oils and emulsions.
Indian Tobacco, 1957, 7: 229-32, bibl. 6.

Following the successful use of coconut oil to suppress suckers in flue-cured tobacco [*H.A.*, 24: 3971], an experiment was carried out in 1954–55 on the effects of glycerine, a gum solution and various vegetable oils, applied to the 4 uppermost leaf axils of cigar tobacco plants topped at 14 leaves. In 1955–56 a similar trial was carried out on plants topped at both 10 and 14 leaves. Mineral oils were not included, because preliminary tests had shown them to injure both stems and leaves. The results showed that the use of vegetable oils to suppress suckers in cigar tobacco is unlikely to be of much practical value. In cases where oils or their emulsions suppressed sucker growth in the treated leaf axils, this was followed by enhanced sucker growth in the lower leaf axils.—Cigar and Cheroot Tob. Res. Stat., Vedasandur.

2740. Sastry, A. S., Kurup, C. K. R., and Venkateswaran, M.
Preliminary studies in the control of suckers in tobacco by the use of chemicals.
Indian Tobacco, 1957, 7: 235-41, bibl. 9, illus.

In a preliminary trial on the chewing tobacco variety Valmonnai, suckering was markedly reduced by applying NAA and IBA to the cut stems immediately after topping. The most promising formulations in both cases were 20% triethanolamine solutions. The NAA treatment, in particular, produced improvements in yield and grade that were comparable to those obtained in plants desuckered by hand.—Cigar and Cheroot Tob. Res. Stat., Vedasandur.

2741. Campbell, J. S.
The control of sucker growth in Virginia type tobacco by the mineral oil "Citspray".
Trop. Agriculture Trin., 1958, **35**: 130-3, bibl. 14.

Citspray, a light mineral oil, white in colour, has been shown to be suitable for sucker control on Virginia tobacco and should be applied at the rate of 2 to 4 $cm.^3$ of a 25% oil-water emulsion, the rate depending on the size of the plant. The oil is most economically applied through a pair of [proprietary topping] secateurs, which top the plant and apply the emulsion at the same time. [Author's summary.]—Imp. Coll. trop. Agric.

2742. Rogers, M. J.
Sucker control in flue-cured tobacco.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 115-16.

When MH 30 was applied to tobacco under favourable conditions, yields were increased by 246 lb. per acre over tobacco topped and desuckered by hand, and by 652 lb. per acre over tobacco topped but not desuckered. Heavy mineral oil or oil emulsion applications had slightly less effect. Excess of these materials was slightly phytotoxic. The application of MH too early caused thick, dwarfed and bleached leaves near the top of the plant.

2743. Staševskaja, Ju. A.
The use of potassium permanganate for the control of laterals in *Nicotiana rustica*. [Russian.]
Tabak, 1958, **19**(1): 54-5.

A few crystals of potassium permanganate applied to leaf axils after the removal of suckers and also to scratches made on the base of the petioles inhibited further lateral growth. The treatment, applied simultaneously with topping, advanced technical maturity and increased the weight of the leaves.

2744. Gartner, K.
Prove di coltura di tabacchi ricchi di nicotina. (**Experiments in growing nicotine-rich tobaccos.**)
Tabacco, 1957, **61**: 307-20, bibl. 7.

Results are quoted from Hungarian experiments in which the nicotine content was increased in tobacco (*Nicotiana rustica*) leaves by injecting a mixture of 10% proline and 1% urotropine into the pith cavities of the stems during the growing season. The increase was generally greater than 80% and in most instances more than 100%. Nicotine contents of 6·0–9·3% were found after 3 injections, each of 0·5 c.c. of the mixture, spaced over 1 week. Untopped plants, although they produced lower percentages of nicotine than topped plants, showed a similar response to injection, but appeared to need greater quantities of the mixture. In general, treatment delayed senescence of the leaves. At high rates or with frequent injections there was temporary yellowing and wilting, but this was followed by complete recovery within a few days of cessation of treatment. Further experiments are proposed.

Physiology and biochemistry.

(*See also* 2083, 2108, 2754, 2780o, u.)

2745. Mann, T. J., and Weybrew, J. A.
Inheritance of alkaloids in hybrids between flue-cured tobacco and related amphidiploids.
Tobacco, N.Y., 1958, **146**(12): 20-5, bibl. 9.

Modern derivatives of the probable progenitors of *N. tabacum* combined into amphidiploid combinations were used in a study of the inheritance of alkaloids. The alkaloid content of these "synthetic tobaccos" differs from that of flue-cured tobacco in both quantity and kind. In the cured leaf of the flue-cured tobacco varieties tested, nicotine was the predominant alkaloid and nornicotine was found in lesser amount. In the synthetic tobaccos nicotine and nornicotine were found in approximately equal proportions and total alkaloid content was approximately one-third that of *N. tabacum*. Leaves from approximately 3,000 individual plants, representing three segregating generations of hybrids between *N. tabacum* and two "synthetic tobaccos" were analysed for total alkaloid, nicotine, and nornicotine. Genetic analyses of these preliminary data are presented and discussed. [From authors' summary.]—N.C. St. Coll., Raleigh.

2746. Porter, L. K.
Nicotinic acid as a precursor of the pyridine ring of nicotine.
Diss. Abstr., 1957, **17**: 2409, being *Publ.* 24,239 of 88 pp.

Techniques were developed for obtaining nicotinic acid labelled with C^{14} and with C^{14} plus N^{15}. The C^{14} nicotinic acid was injected in the stems of *Nicotiana rustica* plants grafted onto tomatoes, and the C^{14} plus N^{15} nicotinic acid into intact *N. rustica* plants. The injected nicotinic acid served as a precursor of the pyridine ring of nicotine synthesized by both the intact and grafted plants, but in the latter little or no natural synthesis of nicotine occurred after the grafting operation. The results support the hypothesis that the tobacco root is the active site of the synthesis and degradation of the heterocyclic ring portion of the nicotine molecule, but also indicate that the tobacco shoot as well as the root may utilize the heterocyclic ring portion in forming nicotine.—N.C. St. Coll.

2747. Solt, M. L.
Nicotine production and growth of excised tobacco root cultures.
Plant Physiol., 1957, **32**: 480-4, bibl. 14.

During the exponential phase of growth the roots of Turkish tobacco produced nicotine at a constant rate of 0·191 µg. per mm. length or 29·05 µg. per mg. dry weight. When the growing tips and mature regions of the root were cultured separately, nicotine increases resulted only in the case of the tips. By the use of indoleacetic acid in proper concentration, nicotine synthesis was observed only in those roots where elongation occurred. [From author's summary.] —Columbia Univ., N.Y.

2748. Solt, M. L.
Nicotine production and growth of tobacco scions on tomato rootstocks.
Plant Physiol., 1957, **32**: 484-90, bibl. 15.

The pattern of alkaloid synthesis in the tobacco shoot was studied using two varieties of *Nicotiana tabacum* (Turkish and Connecticut Shade No. 49) and one of *N. rustica* var. *brasilia* grafted to Marglobe tomato rootstocks. Total pyridine alkaloid increased rapidly at first and then progressively more slowly in collections taken at four stages of growth (the last at the seed pod stage). The order of increasing rates of accumulation was: *N. rustica* < Connecticut 49 < Turkish. Analyses of individual leaves showed that they accumulate nicotine as they grow but the upper leaves accumulate less per unit of dry weight than do the lower leaves. Turkish and Connecticut 49 stems contain about twice as much alkaloid as the leaves; two-thirds of this was in the lowest stem segment. Conclusive evidence for actual nicotine synthesis in the shoot was obtained by the isolation of radioactive nicotine from scions which had been excised and fed through their cut ends with tritium-labeled nicotinic acid. [Authors' summary.]—Columbia Univ., N.Y.

2749. Pyriki, C., and Müller, R.
Das Verhalten einiger Alkaloide unter dem Einfluss von Propfungen bei verschiedenen *Nicotiana*-Arten. (**The influence of grafting on behaviour of certain alkaloids in several species of *Nicotiana*.**)
Reprinted from *Abh. dtsch. Akad. Wiss. Berlin*, 1956, No. 7, pp. 117-25, bibl. 12.

Leaves of grafted and ungrafted species of *Nicotiana* were able to convert nicotine to nornicotine. This ability was apparent in Neuforchheimer, Geudertheimer, *Nicotiana glutinosa*, *N. longiflora* and *N. glauca*, but was not observed in Havana IIc. The capacity of *N. glauca* to form anabasine was marked in the graft combinations tested. Anabasine, nicotine and measurable amounts of nornicotine were present in the roots of *Nicotiana* species. [See also *H.A.*, 27: 1625.]—Inst. Tabakforsch., Dresden.

2750. Egri, L.
Untersuchung über die Alkaloide einiger Tabaksorten mit besonderer Berücksichtigung der Erforschung der Biosynthese von Nornikotin. (**Investigations on the alkaloids of some tobacco varieties with special reference to the study of the biosynthesis of nornicotine.**)
Fachl. Mitt. oest. Tabakregie, 1957, **1**: 19-24, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 0890.

Grafting experiments have shown that tobaccos in which nornicotine is dominant generally contain more products of oxidization than those with nicotine dominant. The form under which N is supplied to plants can modify the composition of the alkaloids, which is related to the activity of oxidizing enzymes. This modification is not accompanied by any morphological changes. By modifying growth conditions (soils and fertilizers) it is possible to obtain less toxic tobaccos. It is concluded that the hypothesis that nornicotine is a secondary product requires re-examination.

2751. Pyriki, C.
Die Verteilung der wasserdampfflüchtigen Alkaloide in den Organen der *Nicotiana*-Arten bei geköpften und ungeköpften Pflanzen. **(The distribution of steam-volatile alkaloids in the organs of *Nicotiana* species in topped and untopped plants.)**
Reprinted from *Pharm. Zentralh.*, [1956?], **95**: 91-6, bibl. 1.

In *Nicotiana* species the leaves do not always contain the highest quantities of steam-volatile alkaloids. In some cases maximum contents occurred in roots. Topped plants had lower root contents of volatile alkaloids than untopped plants, but leaf contents were not affected by topping. [See also *H.A.*, 26: 2908n.]—Inst. Tabakforsch., Dresden.

2752. Hess, E. H.
The polyphenolase of tobacco and its participation in amino acid metabolism. I. Manometric studies.
Arch. Biochem. Biophys., 1958, **74**: 198-208, bibl. 20.

An active polyphenolase has been isolated from tobacco free of any impurities which might interfere with manometric studies. Enzymic oxidation of catechol, caffeic acid, and chlorogenic acid has been studied. The phenolase of tobacco is capable of functioning similarly to that of other plants in relation to protein metabolism. Further evidence for the presently accepted mechanism of amino-oxidized polyphenol combination is presented. [Author's summary.]—Franklin and Marshall Coll., Lancaster, Pa.

Diseases and pests.

(*See also* 2780c, i, s, v, w.)

2753. Vekemans, J.
Méthodes de lutte contre les ennemis du tabac et de la pomme de terre. **(Control measures against diseases and pests of tobacco and potato.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 1:29, illus.
Méthodes de lutte contre les ennemis du tabac. **(Control measures against tobacco diseases.)**
Rev. int. Tabacs, 1958, **33**: 59-62, 83-8.

General recommendations are given for applying chemicals to crops and soil in the Belgian Congo, followed by more specific instructions for treating tobacco for the prevention or control of *Alternaria longipes*, *Cercospora nicotianae*, *Pseudomonas tabacum*, *Erysiphe cichoracearum*, ants, termites, greenfly, borer (*Phthorimea heliopa*) and budworm (*Heliothis*).

2754. Bajlov, D., Stefanova, M., and Andrejčeva, M.
Nature and causes of green spot (aladža) of tobacco leaves. [Russian, with German summary ½ p.]
C.R. Acad. bulg. Sci., 1957, **10**: 509-12, bibl. 18.

The cause of green spot, a serious disorder of Oriental cigarette tobacco, known in Italy as verderame, remains unexplained. On analysis both bright and olive green spots on the leaves were found to contain chlorogenic acid, whereas brown spots did not. Irrespective of spot colour the spotty leaves contained more protein and less carbohydrate than comparable healthy leaves. The spot colours were reproduced *in vitro* by the oxygenation of chlorogenic acid in alkaline solitions.

2755. Pound, G. S., and Welkie, G. W.
Iron nutrition of *Nicotiana tabacum* L. in relation to multiplication of tobacco mosaic virus.
Virology, 1958, **5**: 371-81, bibl. 17, illus.

Tobacco grown in water culture solutions containing various levels of iron responded with a gradient of growth and characteristic deficiency symptoms. Infection with tobacco mosaic virus resulted in decreased growth at all levels of iron. Mosaic symptoms were reduced in intensity by decreased levels of iron. Virus infection of deficient plants reduced the deficiency chlorosis of apical leaves. This reduction of deficiency chlorosis in apical leaves is believed due to translocation of chloroplast components from the basal leaves, released as a result of chloroplast disintegration by virus infection. Moderate iron deficiency did not influence the concentration of virus obtained from leaf samples or leaf discs. Extreme iron deficiency did, however, reduce virus concentration. Only at a low critical level did deficiency of iron exert a greater limitation of virus multiplication than on host growth. At this level, host metabolism was so unbalanced that roots excreted large amounts of a yellow pigment which had properties of riboflavin. [Authors' abstract.]—Univ. Wis., Madison.

2756. Benda, G. T. A., and Naylor, A. W.
On the tobacco ringspot disease. III. Heat and recovery.
Amer. J. Bot., 1958, **45**: 33-7, bibl. 8, illus.

Nicotiana tabacum L. var. "Turkish" plants, which had recovered from the tobacco ringspot disease, were exposed to a minimum temperature of 35° C. for 10 days. Upon return to ordinary greenhouse conditions, they developed typical ringspot symptoms, from which, if they continued to grow, they again recovered. One recovered plant was twice placed at high temperature, and it went through the usual cycle of symptoms and recovery three times. The leaves of axillary shoots of heat-treated, recovered plants frequently developed typical symptoms. It is surmised that recovered leaves are symptomless only when they continuously contain virus and are evenly invaded. Exposure of the intact tobacco plant to 35° C. for a prolonged period is thought to inhibit the movement of virus and to inactivate ringspot virus *in vivo*. When recovered tissue freed from virus is re-infected, it reacts with the formation of necrotic lesions as does healthy tissue. [From authors' summary. For parts I and II see *H.A.*, 25: 1821 and 28: 576.]—Univ. Notre Dame, South Bend, Indiana and Duke Univ., Durham, N.C.

2757. Wills, W. H.
Antibiotics disappointing for the control of blue mold of tobacco.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 119-20.

From tests during 2 years it is concluded that agricultural antibiotics offer no advantages over ferbam and zineb for the control of blue mould in plant beds.

2758. Prasad, N., Patel, I. M., and Shah, H. M.
Chitri disease of tobacco in Gujarat. I. Nature of disease.
Indian Tobacco, 1957, **7**: 243-58, bibl. 14, illus.

The most conspicuous symptoms of this disease of bidi tobacco is the wilting of leaves on one side of the plant. The course of the disease resembles, but is not identical to, that of *Fusarium* wilt of tobacco. Studies of isolates and pathogenicity tests have revealed 12 pathogenic strains of *Fusarium* belonging to the species *F. oxysporum* f. *nicotianae* and *F. solani* f. *nicotianae*. None of the isolates alone induced symptoms exactly corresponding to those of chitri, but a mixture of strains did reproduce the disease. Nematodes accentuated the damage. Fumigation of diseased areas with Shell DD in doses as high as 75 gal./acre failed to control the disease.—Bidi Tob. Res. Scheme, Anand.

2759. Everette, G. A.
Strains of *Fusaria* and their effect on tobacco varieties.
Tobacco, N.Y., 1958, **146**(13): 20-5, bibl. 11.

Twenty-two *Fusarium* isolates were used to inoculate susceptible varieties of cotton, sweet potato, flue-cured and burley tobacco and classified according to their pathogenicity. At least 17 strains of *Fusarium* appeared to be present. The rating of tobacco varieties in field tests did not differ appreciably from laboratory rating, which seems to be a valid method, although insufficiently refined for individual plant selection.—W. Ky agric. Exp. Stat.

2760. Stephen, R. C.
Resistance and *Cercospora nicotianae* in the genus *nicotiana*.
Emp. J. exp. Agric., 1958, **26**: 70-5, bibl. 10.

One hundred and thirty-one *Nicotiana tabacum* types of various kinds and 12 other *Nicotiana* species were found to be susceptible to attack by *Cercospora nicotianae*. No immune material was revealed. Small differences in degree of infection were found among varieties. The differences were found to be associated with the varietal response to two environmental factors, namely, leaf maturity at reaping and the date of transplanting to the land. [Author's summary.]—Tob. Res. Bd Rhod. Nyasal.

2761. Stephen, R. C.
Some observations on the incidence of frog-eye disease (*Cercospora nicotianae* Ell. and Ev.) in flue-cured tobacco seedbeds.
Rhod. agric. J., 1958, **55**: 63-5, bibl. 9.

Early sown seedbeds which matured at about the time of the first rains were free from infection. Later sowings were increasingly infected, and spraying with bordeaux, 4 : 4 : 50, reduced percentage infection. Spore trap data indicated a possible relationship between disease incidence and numbers of conidia present in the air.

2762. Stephen, R. C.
The influence of nitrogen, phosphorus, and potassium nutrition of flue-cured tobacco on the incidence of *Cercospora* leafspot disease.
Emp. J. exp. Agric., 1958, **26**: 64-9, bibl. 11.

When the barn-spot phase of the disease (*Cercospora nicotianae*) was checked by the use of high yellowing temperatures and humidities during curing, the disease incidence was inversely related to the rate of fertilizer N used. When barn-spot development proceeded unchecked the relationship was direct. The same trends existed with fractional applications of N, but to a much lesser extent. The rate of P or of K applied had no effect on the amount of disease, whether barn spots were suppressed or allowed to develop. [From author's summary.]—Tob. Res. Bd Rhod. Nyasal.

2763. Minev, K.
Biologija duhanske pepelnice—*Erysiphe cichoracearum* D.C. **(The biology of tobacco powdery mildew.)** [English summary 1½ pp.]
Annuaire Fac. Agric. Sylvic., Skopje, 1956/57, 1957, **10**: 5-72, bibl. 67, illus.

The biology of the pathogen is described and some of its host plants are listed. Of 30 tobacco varieties studied the oriental types were the most susceptible and the Virginia types among the most resistant. It was found that irrigation, topping and N application increased disease incidence. Powdery mildew depressed but did not inactivate tobacco mosaic virus. The disease affected leaf composition, reducing quality.

2764. Marcelli, E.
Un nuovo prodotto per la lotta contro l'oidio del tabacco: il karathane. Prime esperienze di lotta in serra ed in campo. **(Karathane, a new product for combating powdery mildew of tobacco. Preliminary greenhouse and field experiments.)** [English summary ⅓ p.]
Tabacco, 1957, **61**: 262-9, bibl. 9.

In greenhouse experiments karathane at 0·06%, 0·12% and 0·18% was more effective than a 0·8% solution of Shirlan containing 25% of salicylic anilide. At the higher rates protection lasted for 3 weeks and at the lowest rate for a fortnight. In field experiments the plants were protected for a fortnight by karathane, either as a 0·06% solution of the wettable powder or as a 0·05% emulsion, without detriment to either taste or aroma.

2765. Yadao, A. I.
Tests of five insecticidal sprays in the control of insects affecting tobacco.
Philipp. Agric., 1956, **40**: 185-94, bibl. 10, [received 1958].

In field tests DDT gave the best general protection; calcium arsenate was phytoxic. In the laboratory parathion quickly killed *Phaneroptera furcifera* and parathion and endrin were effective against *Prodenia litura*.

2766. CHAMBERLIN, F. S.
History and status of the green peach aphid as a pest of tobacco in the United States.
Tech. Bull. U.S. Dep. Agric. **1175**, 1958, pp. 12, bibl. 35.

Since 1946 sporadic outbreaks of green peach aphid (*Myzus persicae*) have occurred on all types of tobacco in the U.S.A. The problem of control is complicated by the uncertainties attending infestations and the need for treatments. In shade-grown tobacco, however, the risk of heavy losses is so great as to justify applying DDT or other aphicides as preventive sprays.

2767. MORGAN, O. D.
Observations on fumigation of tobacco soils.
Plant Dis. Reptr, 1958, **42**: 316-17, illus.

In tests over 3 years both autumn and spring applications of Nemagon, broadcast on the surface and ploughed in, have given encouraging results against root-knot nematodes. Tobacco crops suffered no visible injury from spring applications of up to 250 lb. 10% Nemagon per acre applied 3 weeks before planting. —Dep. Bot., Univ. Md.

Curing, fermentation and composition.

(*See also* 2780d, f, h, m, q.)

2768. SIGAL, L. A.
Leaf arrangement when stringing the leaves of the tobacco variety Ostrolist 2747. [Russian.]
Tabak, 1958, **19**(1): 48-51.

In experiments on several collective farms in the Ukraine on methods of stringing leaves of the shade-dried tobacco Ostrolist 2747, it was found that leaves placed face to face produced better quality raw material than leaves placed face to back in the usual way.

2769. PAL, N. L.
Some improvements in flue-curing schedule.
Indian Tobacco, 1957, **7**: 219-27, illus.

During 1957 4 batches of tobacco were cured in 2 types of barn, the standard barn used by farmers and a modified barn designed by the Central Tobacco Research Institute, Rajahmundry. Both barns were the same size, 16 ft. × 16 ft. × 16 ft., provided with 4 compartments each holding 4 tiers, and with 3 additional tiers in the gable. The Institute's barn differed from the standard barn in the number of flue pipes and in the types of top and bottom ventilators. In addition, the curing schedule was modified in the Institute's barn by starting both the fire and top and bottom ventilation much sooner than in normal practice. This new schedule resulted in an increase in the proportion of bright leaf grade tobacco produced and in reductions in the amount of coal consumed and in the time taken to complete curing. Most of this improvement is attributed to the modified schedule rather than to the changes in barn design.

2770. HENSON, W. H., JR., HASSLER, F. J., AND JOHNSON, W. H.
Yellowing flue-cured tobacco in the bulk.
Tobacco, N.Y., 1958, **146**(11): 20-5, bibl. 7, illus.

In a bulk yellowing experiment, using var. D.B.101, 3 types of ventilation were tested, viz. no mechanical ventilation, periodic ventilation holding the temperature to 100° F. maximum, and continuous ventilation. Temperatures of the pile and ambient air, air pressures and rate of flow, quality and sugar content of the leaf were studied. Comparative limits of ventilation in the tests were from 0 to 25 ft.^{3}/min./ft.^{2} of bulk cross section. Ventilation within these limits did not appreciably affect the sugar contents of the cured leaves. However, for zero ventilation, almost two-thirds of the tobacco was damaged by high pile temperatures. It appears that the amount of ventilation is not critical, within the limits of this experiment, provided there is enough aeration to keep pile temperatures in the range of normal yellowing temperatures, namely, 90° F. to 100° F. The heat of respiration is sufficient to keep pile temperatures in this range. Leaves were dried to approximately 73% of their original weight by continuous aeration at the rate of about 25 ft.^{3}/min./ft.^{2} during the yellowing period. Leaves with no aeration dried to approximately 84% of their original weight. When finished in a conventional curing barn, bulk-yellowed tobacco compared favourably with conventionally cured tobacco on the basis of colour and aroma.—U.S.D.A., and N.C. St. Coll., Raleigh.

2771. BARTOLUCCI, A.
Influenza dell'umidità assoluta e della densità d'imballamento sui tabacchi orientali sottoposti a fermentazione extra stagionale. **(Influence of absolute humidity and density of baling on artificially fermented oriental tobacco.)** [English summary ½ p.]
Tabacco, 1957, **61**: 321-35, bibl. 4.

Turkish tobacco was baled with moisture contents ranging from 14% to 20% and at densities of 222, 247, 278, and 317 kg. per cu. m. and afterwards dried in conditioned air and artificially fermented. Where there were no initial defects, drying at approximately 42° C. over 11 days and fermenting at 44·75° C. and 70·64% R.H. for 22 days caused no damage. Optimal conditions included baling at 222 kg. per cu. m. and an absolute moisture content of 16–18%. Higher densities were uneconomic. The advisability of raising the hygrometric index from 13% to 14·5% was confirmed.

2772. TOTUBALIN, N. N.
An investigation on the process of tobacco fermentation by means of electric current from the mains. (First communication.) [Russian.]
Tabak, 1957, **18**(3): 40-2, bibl. 1.

Bales of tobacco of high, normal and low humidity were subjected to alternating current at voltages of 220, 110 and 55 in fermenting chambers through wire mesh electrodes. Conductivity, the effect of the periodicity of the current on the duration of fermentation and the heating effect were studied.

2773. ASMAEV, P. G., AND TRUBNIKOV, V. F.
On the problem of fermenting tobacco in a loose mass. [Russian.]
Tabak, 1957, **18**(4): 29-33, bibl. 4, illus.

From experiments conducted at Krasnodar it is concluded that starting fermentation by forcing heated air through the loose mass of tobacco is economically and technically sound. The optimum speed of air at

50° C. for heating a layer of tobacco 1·2–1·5 m. deep is 0·6 to 1 m./sec. At this air velocity the time taken to reach fermentation temperature, i.e. 48° C., in tobacco of normal humidity in a mass with a density of 37–65 kg./cu. m. does not exceed 50 min.

2774. Elliot, J. M., and Birch, E. C.
Chemical composition of various commercial grades of Canadian flue-cured tobacco.
Canad. J. Plant. Sci., 1958, **38**: 73-80, bibl. 20.

A study was made of the chemical composition of 21 commercial grades of Canadian flue-cured tobacco, selected from a 50-acre crop of Hicks variety in 1955. Arbitrary prices were assigned to the various grades of tobacco. Correlation coefficients between the chemical values and the assigned grade prices were calculated. Ethanol extracts, total sugars, reducing sugars, and hydroscopicity gave significant positive correlations; total nitrogen, protein nitrogen, total alkaloids, nicotine, calcium and magnesium gave negative correlations. These coefficients indicated that quality measured by these laboratory methods conformed with leaf-graded quality. Correlation coefficients were not significant between grade quality and petroleum ether extract, sucrose, starch, ash, silica, potassium, phosphorus, chlorine, sulphur, burn, or pH. [Authors' sbstract.]—Canad. Dep. Agric., Delhi, Ont.

2775. Asmaev, P. G., and Zagoruiko, M. G.
Changes in the composition of tobacco in relation to the conditions of drying.
[Russian.]
Trudy Krasnodarsk. Inst. Pishchevoi Prom., 1956, **8**: 3-13, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 1008.

The content of carbohydrates and polyphenols in leaves picked at technical maturity increases during curing, mainly in those which cure out an orange-red colour. In early stages of curing the richer the leaves are in carbohydrates, the greater their protein-N content. The longer the curing, the greater the protein-N content. Protein hydrolysis in dead leaf tissue is accompanied by the formation of N compounds that are precipitable by $Cu(OH)_2$, and if curing is too slow, N compounds insoluble in hot water are formed.

2776. Weaving, A. S.
The polyphenols of flue-cured tobacco. Separation and identification of the major polyphenols.
Tobacco, N.Y., 1958, **146**(7): 20-7, bibl. 49, illus.

The major constituents are rutin (3-rhamno-glucoside of 5 : 7 : 3′ : 4′-tetrahydroxy flavonol), the chlorogenic acids, scopoletin (7-hydroxy-6-methoxy coumarin), scopolin (7-glucoside of scopoletin), and an unidentified compound which has a pink fluorescence in ultra-violet light. The polyphenols of tobacco do not contain catechins or leucoanthocyanins. No evidence for free caffeic acid could be found in the samples of flue-cured tobacco examined. No qualitative differences in the major polyphenols have been found in several samples of flue-cured tobacco. There are, however, quantitative differences in the polyphenols. The method of curing employed has a large bearing on the polyphenols present, since in fire-cured and air-cured tobaccos it was found that most of the major polyphenols except scopolin and scopoletin had been destroyed. [From author's conclusions.]—Res. Dep., Imperial Tobacco Co., Bristol.

2777. Giovannozzi-Sermanni, G.
Ricerche analitiche su *Nicotiana tabacum* con cromatografia su carta. VI. Metodo di di dosaggio degli acidi clorogenico e caffeico. **(Analytical studies on *Nicotiana tabacum* by paper chromatography. VI. Methods of determining chlorogenic and caffeic acids.)** [English summary 6 lines.]
Tabacco, 1957, **61**: 336-57, bibl. 30.

The presence of chlorogenic and caffeic acids was confirmed in green and cured samples of Maryland Catterton tobacco. Other polyphenolic compounds found were naringenin, naringin, quercimetrin, hydrocaffeic acid and ferulic acid. During air curing there was a general increase in polyphenolic substances. [For part V see *H.A.*, 27: 2596.]

2778. Frankenburg, W. G., Gottscho, A. M., and Vaitekunas, A. A.
Biochemical conversions of some tobacco alkaloids.
Tobacco, N.Y., 1958, **146**(8): 20-4, bibl. 40.

During air-curing of cigar tobacco leaves there is a loss of about 10% of nicotine. The fate of this nicotine has not been determined. On the other hand, during ageing and fermentation of Pennsylvania cigar filler tobacco, there is a marked decrease of nicotine with a concomitant increase of nicotine transformation products. Eight of these products have been identified, and others have been postulated. Evidence is presented for a pathway by which the nicotine is converted into the transformation products. In contrast to the conversions taking place in the fermenting leaf, conversions of nicotine caused by bacterial enzymes are described in which the pyridine ring is attacked *via* hydroxylation at the 6 position. Among the products formed by the bacteria, and not present in the fermented tobacco leaf, are 6-hydroxynicotine, 3-succinoyl pyridine, 3-succinoyl-6-hydroxypyridine, and 6-hydroxynicotinic acid. [From authors' summary.]—Res. Lab., General Cigar Co., Lancaster, Pa.

2779. Onishi, I., and others.
Studies on the essential oils of tobacco leaves. I to XII. [Japanese.]
Agric. Chem. Soc. Japan B., 1955, **19**(2): 137-52, 1957, **21**(1): 38-46, **21**(2): 82-98, and *Japan Monopoly Corp. cent. Res. Inst. sci. Paps*, 1956, **96**: 53-78, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstrs 0843-57.

Twelve papers, three of which are in two parts, cover the following fractions: acid, carbonyl, phenyl, neutral, acid fraction of the American flue-cured leaf, acid fraction in the Japanese flue-cured leaf before redrying and ageing.

Noted.

2780.
a Byles, D. V.
Tobacco leaf production in Mauritius.
Rev. agric. sucr. Maurice, 1958, **37**: 28-39.
Practical hints to growers especially on flue-curing Virginia type leaf.

b Chawkat, M. J.
La culture du tabac en Syrie. **(Tobacco growing in Syria.)**
Rev. int. Tabacs, 1958, **33**(302): 27-30, illus.

c Clayton, E. E., and others.
Resistance to the root knot disease of tobacco.
Tobacco, N.Y., 1958, **146**(18): 20-5; (19): 20-4, bibl. 28, illus.
A progress report on breeding for resistance to *Meloidogyne incognita*.

d Griffith, R. B.
The rapid determination of total alkaloids by steam distillation.
Tobacco, N.Y., 1957, **145**(10): 26-33, bibl. 5, illus.
A development of the method of Willits *et al.* (*Analyt. Chem.*, 1950, **20**: 430-3) with an accuracy of ±1%.

e Jalihal, K. A., and Rao, M. S. K.
S.20-2: an improved *bidi* tobacco variety for the Nipani tract.
Mysore agric. J., 1957, **32**: 142-4.
Outyields local varieties by 15–30% and is more heavily spangled.

f Junošev, V. K.
On the nature of pigments in tobacco. [Russian.]
Tabak, 1957, **18**(3): 33-6, bibl. 13.
Flavonoids and derivatives of cinnamic acid.

g Latuszynski, G.
La culture du tabac à cigarettes (*Nicotiana tabacum*) à faible teneur en nicotine. **(Growing cigarette tobacco of low nicotine content.)**
Rev. int. Tabacs, 1958, **33**(303): 51-8, bibl. 8, illus.
The morphology and performance of hybrids of Virginia Gold × Multan 27 in Poland.

h Mann, J. D.
The metabolism of glycolic acid in tobacco leaves.
Diss. Abstr., 1957, **17**: 2408, being *Publ.* 24,308 of 97 pp.

i Marcelli, E.
Risultati di alcuni trattamenti contro le muffe delle garze adibite alla costruzione di capanne per tabacchi da fascia. **(Results of certain treatments for control of moulds on cheese cloth used as a cover in growing binder tobacco.)** [English summary ¼ p.]
Tabacco, 1957, **61**: 255-61, bibl. 1.
Mercury phenyl oleate at 0·2% gave good control.

j Mashkovtsev, M. F., and Pisareva, E. N.
The nitrogen requirements of tobacco in its early stages of growth. [Russian.]
Sb. nauč.-issled Rab. Vses. n.-i. In-t. Tabaka i Makhorki, 1956, **149**: 208-19, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 9029.
Excess N reduces growth and nicotine formation and favours autolysis of tissues.

k Ortiz R., G.
Situación del cultivo de tabaco en el Valle del Cauca. **(Present state of tobacco cultivation in the Cauca valley.)**
Agric. trop. Bogotá, 1957, **13**: 693-9, bibl. 6, illus.
Production, climatic effects, varieties.

l Postiglione, L.
Sui valori del pH dei terreni italiani coltivati a tabacco. **(The pH values of Italian tobacco soils.)** [English summary 9 lines.]
Tabacco, 1957, **61**: 464-79, bibl. 9.
Generally with higher pH values than recommended elsewhere.

m Pyriki, C.
Tabak-Analytik unter besonderer Berücksichtigung der Papierchromatographie der Alkaloide. **(Tobacco analysis with special reference to the paper chromatography of alkaloids.)** [English, French and Russian summaries ½ p. each.]
Reprinted from *Die Nahrung*, 1957, **1**: 114-25, bibl. 51.

n Raeber, J. G.
Handling and storage of tobacco seed.
Rhod. Tobacco, 1958, No. 16, pp. 27-9, illus.
Notes on cleaning, silver nitrate treatment, germination test procedure and storage.

o Reddi, K. K.
Studies on tobacco leaf ribonuclease. II. Mechanism of action.
Biochim. biophys. Acta, 1958, **28**: 386-91, bibl. 11.
Part I was noted in *H.A.*, 28: 589g.

p Sirotenko, A. A.
Biochemical characteristics of the varieties of makhorka (*Nicotiana rustica*) which are resistant to top chlorosis. [Russian.]
Sb. nauč.-issled Rab. Vses. n.-i. In-t. Tabaka i Makhorki, 1956, **149**: 122-30, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 0879.

q Trifu, I., and Ille, C.
The fermentation of whole tobacco plants immediately after harvest. [Rumanian.]
Lucrarile Inst. Cercetari alim., 1957, **1**: 163-74, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 1011.
Chemical data on Virginia bright leaves treated by the new and by conventional methods.

r Valleau, W. D.
Genetic veinbanding—a white-flowered tobacco mutant.
Tobacco, N.Y., 1958, **146**(10): 20-2, bibl. 3, illus.

s Vayssière, P.
Aperçus sur la culture et plus spécialement sur les parasites du tabac à Sumatra. **(A brief account of the cultivation, and more particularly of the parasites, of tobacco in Sumatra.)**
J. Agric. trop. Bot. appl., 1957, 4: 281-302, bibl. 20, illus., and reprinted in *Rev. int. Tabacs*, 1958, **33**(301): 31-9, **33**(302): 31-44, bibl. 20, illus.

t WADSWORTH, V.
The minimum economic unit for a new tobacco farmer.
Rhod. Tobacco, 1958, No. 16, pp. 12-13.
Capital requirements and expected returns on holdings of 40, 50 and 60 acres.

u WALTZ, P.
Atmung und CO$_2$-Fixierung des Tabaks. **(Respiration and the respiratory quotient of tobacco.)**
[*Publ.*] *Eidg. Tech. Hochschule, Zürich*, 1957, from *CORESTA Inf. Bull.*, 1957, No. 4, Abstr. 0881.

v WELKIE, G. W.
Manganese and iron nutrition of *Nicotiana tabacum* L. in relation to multiplication of tobacco mosaic virus.
Diss. Abstr., 1957, **17**: 2115, being *Publ.* 22,439 of 67 pp.
See *H.A.*, 27: 2584 and abstract 2755 in this number.

w WELKIE, G. W., AND POUND, G. S.
Manganese nutrition of *Nicotiana tabacum* L. in relation to multiplication of tobacco mosaic virus.
Virology, 1958, **5**: 92-109, bibl. 17, illus.
For an advance abstract of this paper see *H.A.*, 27: 2584.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 2839c-e, 3211.)

2781. FERRARA, A.
Tecnologia delle spezie: cannella, zenzero, curcuma. **(Technology of spices: cinnamon and ginger.)**
Riv. Agric. subtrop. trop., 1958, **52**: 50-70, illus.

This is the final article of the series [see also *H.A.*, 27: 2847, 3665, and 28: 590, 1603]. Ceylon cinnamon (*Cinnamomum zeylanicum*) and Chinese cinnamon (*C. obtusifolium*) are described, with details of their harvesting, preparation, chemical composition, essential-oil characteristics, uses, adulteration, production and trade. Brief mention is also made of Annam cinnamon, which is var. *louereirii* of the Chinese species. The account of "root" ginger (*Zingiber officinale*) covers the same points, including considerable chemical details. A slightly briefer account is given of "stem" ginger (*Curcuma longa*) which is also a source of arrowroot.

2782. SCHWARTZ, H. M., AND BÜRKE, R. P.
The chemistry of naras seed (*Acanthosicyos horrida,* Hook). III.—The amino-acid composition of the protein.
J. Sci. Food Agric., 1958, **9**: 159-62, bibl. 17.

The amino-acid composition of naras protein is shown to be, in general, very similar to that of edestin which it resembles in physical properties. There are, however, significant differences in the content of tryptophan, arginine and glutamic acid. From the point of view of nutritive value, naras protein is deficient in lysine. [Authors' summary.] Naras seeds are used in the confectionery industry in South Africa.—Nat. chem. Res. Lab., S. Afr. C.S.I.R.

2783. NICHOLS, R., AND PRYDE, J. F. P.
The vegetative propagation of nutmeg (*Myristica fragrans*) by cuttings.
Trop. Agriculture Trin., 1958, **35**: 119-29, bibl. 12, illus.

Nutmeg was successfully propagated, using semi-hardwood or hardwood cuttings 12 to 15 in. long and ¼ in. in diameter at the base, selected from watershoots or wound shoots. A mixture of coconut fibre and sievings was used as a medium; the cuttings were given a 0·05% IBA quick dip, and this was repeated 8 weeks later. Rooting took about 4 months and the cuttings were ready for transplanting 3 months later.—Imp. Coll. trop. Agric.

2784. MÜLLER, H. W. K., AND SAUTHOFF, W.
Zum Auftreten und zur Bekämpfung einer durch *Sclerotinia sclerotiorum* (Lib.) de Bary hervorgerufenen Krautfäule an Blattpetersilie (*Petroselinum hortense* Hoffm.) im Winteranbau unter Glas. **(Occurrence and control of *Sclerotinia sclerotiorum* on winter parsley under glass.)**
Zbl. Bakt., 1958, **111**: 178-84, bibl. 18, illus.

Leaf rotting in parsley caused by *Sclerotinia sclerotiorum* has occurred in winter crops grown in a heated glasshouse. Spraying with PCNB at the end of October has given good control. Cultural measures which will reduce *Sclerotinia* infection are also discussed.—Staatsinst. angew. Botanik, Hamburg.

2785. SHER, S. A., THOMASON, I. J., AND McCASLIN, R. L.
Chisel application of methyl bromide for root-knot nematode control.
Plant Dis. Reptr, 1958, **42**: 288-90, bibl. 4.

Injection of methyl bromide at 150 and 200 lb. per acre gave good control of root-knot nematode (*Meloidogyne incognita*) and significant increases in yield of sweet basil. Results obtained by confining the fumigant either with a tarpaulin or other gastight seal or by rolling and sprinkling were similar.—Citrus Exp. Stat., Riverside.

Drug plants.

(*See also* 2074, 2103, 2104, 2113, 2839a, h, i, k, n, p, u-w, 2840a, g, j, n, 3199, 3211.)

2786. BRĄGIEL, I., AND PELCZARSKA, E.
Aglutyniny roślinne (fitoaglutyniny). **(Plant agglutinins.)**
Postępy hig. i med., doświadoz., 1956, **10**(3): 317-25, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,560.

Extracts from certain plants agglutinate either all or different groups of blood. Plants mentioned, which nclude *Laburnum alpinum*, *Cytisus sessilifolius*, *Lotus etragonolobus*, *Vicia cracca*, *Sophora japonica*, *Coronilla aria*, *Vitis acitivalis* and *Vicia graminea*, contain their anti-O(H), —A, —B or —N agglutinins. The gglutinins were found to be concentrated in the torage organs, i.e. seed and fruit.

787. SOKOL'SKAJA, A. M.
Some results of investigations on saponins in the Kazahstan flora. [Russian.]
Apteč. Delo, 1956, 5(6): 22-4, from *Ref. Ž. (Biol.)*, 1957, No. 23, Abstr. 97,561.

aponins were found in *Patrinia intermedia*, *Medicago ativa* and *Gypsophila paniculata* but not in *Rheum aximoviczii*.

788. ČEVRENIDI, S. H.
Some problems of the biology of soaproot and attempts to introduce it into cultivation. [Russian with Uzbek summary.]
Izv. AN UzSSR, 1956, No. 12, pp. 55-62, from *Ref. Ž. (Biol.)*, 1957, No. 21, Abstr. 90,266.

n Uzbekistan *Acanthophyllum gypsophiloides* grown on ry land produced a much greater mass of roots than hen grown under irrigation, but had a 5% lower aponin content. In the second year the yield of roots er ha. on dry land amounted to 1·5 tons at 150,000 lants/ha. and 2 tons at 200,000 plants/ha.

789. IVASA, —, FUKUDA, —, AND JUSUDA, —.
Histo-chemical studies on plant constituents. V and VI. Seasonal changes in the contents of santonin and essential oil in *Artemisia maritima*. [Japanese, with English summaries.]
J. pharmacognost. Soc. Japan, 1955, **9**(2): 22-5 and 26-30, from *Ref. Ž. (Biol.)*, 1957, No. 21, Abstrs 90,362 and 90,363.

he highest content of santonin and essential oil in the ems, leaves and flowers of *A. maritima* occurred at the nd of June. Parallel changes in the two components rom June to September are recorded. After the eginning of July the santonin content of the stems and eaves declined, but the total content of the plants emained unchanged until early August owing to the ncreased weight of the flowers.

790. DALEV, D., AND OTHERS.
Studies on alkaloid accumulation in *Atropa belladonna* in relation to its growth. [Bulgarian, with Russian summary.]
Farmacija, 1956, **6**(4): 14-16, from *Ref. Ž. (Biol.)*, 1957, No. 23, Abstr. 97,547.

nalyses were made of wild *A. belladonna* from 4 egions in Bulgaria. The highest alkaloid content ccurred in the roots during bud formation and in eaves and stems during bud formation and the beginning of flowering. Later, the alkaloid content declined n all organs. Both green and mature fruits were found o contain a considerable quantity of alkaloids.

791. BONNET, P.
Le bouturage des cinchona de culture à Sérédou (Guinée française). **(Propagation of cultivated cinchona by cuttings at Sérédou, French Guinea.)**
J. Agric. trop. Bot. appl., 1957, **4**: 361-84, bibl. 17.

Rooting was more satisfactory under a rain-proof and sun-proof shelter, tilted from soil level on the south side at 45° and supported on 1·8 m. posts on the north side, than under a framework 1·8 m. high with its horizontal top and vertical sides covered by a loose lattice of raffia leaf ribs. As a substratum over stones and gravel, washed river sand of mixed particle size promoted good rooting and was more satisfactory than fine sand, sieved leaf mould or heat-sterilized earth from termite mounds or ant hills. Under optimal conditions *Cinchona succirubra* cuttings showed 90% and *C. ledgeriana* 75% rooting in 3 months. In the former the age of the parent tree had little effect, and the best results were from vertical shoots 8–15 cm. long with red stems. In *C. ledgeriana*, however, shoots from trees over 3 years old did not root, but 80% or higher proportions rooted when new growth was taken from stumped nursery trees aged 1–2 years. Treatment with Rootone (NAA) greatly increased the speed of rooting, particularly in *C. ledgeriana*, and considerably increased the percentage of success. Where NAA was not used, rooting was markedly advanced by leaving the second pair of leaves whole instead of removing half the blade as in the first pair.

2792. TATTJE, D. H. E.
Gehalteschommelingen in het blad van *Digitalis purpurea*. 1. Het verloop van het gehalte in bladeren van het eerste jaar. **(Variations in the glycoside content of the leaves of *Digitalis purpurea*. I. Changes during the first year of growth.**
Pharmaceut. Weekbl., 1956, **91**: 541-55, illus., from *Biol. Abstr., Sect. D*, 1958, **32**: No. 10,038.

Young leaves show a maximal glycoside content in August (190–200 days after sowing). Mature leaves show 2 maxima; the 1st in July (140–150 days after sowing), the 2nd in October. The ratio gitoxigenin to total aglycones increased from 17 to 35%.

2793. WALENS, H. A., SEROTA, S., AND WALL, M. E.
Steroidal sapogenins. XXXV. Gentrogenin (botogenin) and correllogenin, new sapogenins from *Dioscorea spiculiflora*.
J. organ. Chem., 1957, **22**: 182-5.
WALL, M. E., AND OTHERS.
Idem. XXXIX. Occurrence and isolation of gentrogenin and correllogenin from *Dioscorea spiculiflora*.
J. Amer. pharm. Ass., sci. Ed., 1957, **46**: 155-9, from *Publs Patients east. Utiliz. Res. Develop. Div., U.S. Dep. Agric.*, 1957, **ARS-73-6** (Suppl. 5), Abstrs 1,112 and 1,115.

The chemical and physical properties are described of 2 excellent precursors of cortisone, gentrogenin and correllogenin, isolated from tubers of *Dioscorea spiculiflora*.

2794. LAVIE, D.
The constituents of *Ecballium elaterium*. I. The oxygen functions of elaterin.
Chem. Ind. Lond., 1956, No. 21, pp. 466-7, bibl. 7.
LAVIE, D., AND SZINAI, S.
Idem. II. α-Elaterin.
J. Amer. chem. Soc., 1958, **80**: 707-10, bibl. 20.

LAVIE, D., AND WILLNER, D.
Idem. III. Elatericin A and B.
J. Amer. chem. Soc., 1958, **80**: 710-14, bibl. 23.

The juice of the squirting cucumber, *E. elaterium*, yields a powerful cathartic drug, elaterium, which has long been used in medicine. Chemical studies on elaterium, reported in these papers, have led to the isolation of α- and β-elaterins, elateridin and elatericins A and B, all of which have been shown to possess strong or very strong activity against tumours.—Daniel Sieff Res. Inst., Weizmann Inst. Sci., Rehovot, Israel.

2795. RAPOPORT, H., AND OTHERS.
Alkaloids of *Geissospermum vellosii*.
HUGHES, N. A., AND RAPOPORT, H.
Flavopereirine, an alkaloid from *Geissospermum vellosii*.
J. Amer. chem. Soc., 1958, **80**: 1601-4, bibl. 12, and 1604-9, bibl. 19.

Bark extracts of the apocynaceous tree *Geissospermum vellosii* have long enjoyed a reputation as a febrifuge in Brazilian folk medicine and have recently been reported to have curare-like activity. The first paper describes an improved isolation procedure, which has produced yields of 0·3 to 0·4% of crystalline geissospermine from bark samples. Neither pereine nor vellosine has been found in the bark, but 5 new alkaloids have been isolated, and the structure and chemistry of one of these, flavopereine, are described in the second paper.—Univ. Calif., Berkeley.

2796. LLOYD, H. A., AND HORNING, E. C.
Alkaloids of *Ormosia panamensis* Benth. and related species.
J. Amer. chem. Soc., 1959, **80**: 1506-10, bibl. 4.

Seeds of the Venezuelan tree *Ormosia dasycarpa* Jacks. were reported in 1919 to contain two alkaloids of unknown structure, one of which was described as possessing analgesic action. In an investigation of this problem, it was found that seeds of *Ormosia panamensis* Benth. and related species contained a number of alkaloids; three of these, panamine, ormosinine and ormosanine were oxygen-free bases, and at least two additional oxygen-containing (amide) bases were also present. The major alkaloid, panamine, was found to undergo air oxidation to yield a substance with potent hypotensive properties in dogs. This material may be a *t*-amine oxide. A substance corresponding to the analgesic alkaloid ormosine was not found, although there were some similarities between the properties of panamine and those described for ormosine. [Authors' abstract.]—Lab. Chem. Natural Prod., nat. Heart Inst., Bethesda, Md.

2797. MALYŠEV, A. A.
An experiment in growing ginseng in the mountains of the Northern Caucasus. [Russian.]
Bot. Žurnal, 1956, **41**: 1363-6, bibl. 16.

The ecological conditions prevailing and the growth of ginseng (*Panax ginseng*) in its natural habitat in the mountain forests of the Far East and at Teberda in the Caucasus are compared. In the mountains of the Northern Caucasus ginseng is grown at 1,300–1,700 m., the best sites being on southern, south-western and western slopes of 5–8°, in beech forests providing about a 60% canopy. At Teberda disease incidence during the growing season has so far been negligible, and of the numerous nematode species present none has caused damage.

Essential oils.

(*See also* 2100, 2839m, r, 2840b, d, m, 2841, 2925.)

2798. NEVSTRUEVA, R. I., AND ŠKURAT, D. F.
Essential oil crops in the Soviet Union. [Russian.]
Agrobiologija, 1957, No. 6, pp. 68-75.

Notes are given on the development of the industry and on the varieties, yields and essential oil contents of the more important crops, which include coriander, mint, fennel, carraway, salvia, lavender, rose, camphor basil, geranium, iris, *Cistus* sp. and violet.

2799. BLAKE, M. I.
Analysis of phenol-containing volatile oils.
Analyt. Chem., 1958, **30**: 400-2, bibl. 13.

A titrimetric procedure is described for analysing volatile oils which contain phenolic constituents. Advantages of the method include speed, accuracy and the fact that samples need not exceed 1 g. Results obtained in the analysis of 3 phenols and 5 essential oils (thyme, clove, wintergreen, origanum and bay) are tabulated.—N. Dak. agric. Coll., Fargo.

2800. VOLOŠIN, M. P.
Some growth characteristics of the aerial parts of bay laurels. [Russian.]
Agrobiologija, 1957, No. 6, pp. 143-4, illus.

Experiments conducted at Yalta have shown that to obtain the highest leaf yields bay laurels [*Laurus nobilis*] should be pruned lightly. Severe pruning should only be carried out to rejuvenate older bushes or, where there is a danger of frost, to enhance vigour and facilitate covering. Medium pruning gave the lowest yields. Leaf retention varied from 1 to 5 years depending on growing conditions, cultural methods and the position of the leaves on the plant.

2801. BURGER, A. M.
The cultivation of *Mentha arvensis* in Portuguese West Africa.
Perfum. essent. Oil Rec., 1957, **48**: 482-4, illus.

The crop is shallow rooted but requires adequate cultivation and at least 80 mm. rain per year. The roots are planted in rows 1 m. apart and 5–10 cm. deep. The first cut is taken at blossoming about 2 months after planting; the second cut, which is the richest, 2–3 months later, and, in good years, a third cut is obtainable. The cut stems are left to wilt in the sun, losing 50% moisture, and yields are 6,000–10,000 kg./ha. for the first year. The second year is usually better and the third lower in yield. Four years' harvests can be obtained if fertilizer is applied, but after this the crop must be rotated with maize or beans. The oil is obtained by distillation, and pulegone can be separated from the distillation water by cohobation.

Fibres.

(*See also* 2839b, g, j, y, z, 2840h, l, 3200, 3213.)

2802. Tulajkova, K. P.
The rôle of bacteria of the radiobacter type in the root nutrition of plants. [Russian.]
Agrobiologija, 1958, No. 1, pp. 93-101, illus.

In both pot and field experiments the treatment of hemp seed with a bacterial culture [no species named] stimulated early growth. Subsequently this vigorous growth was only maintained when sufficient mineral fertilizers were available. N or K deficiency resulted in reduced growth and yields. The type of N fertilizer was found to be important, ammonium nitrate giving better results than sodium nitrate or ammonium sulphate. When organic N in the form of peptone was substituted for mineral N the action of the bacteria was also fully effective.

2803. Gorškov, P. A., and Sažko, M. M.
The effect of potassium nutrition on hemp yields. [Russian.]
Agrobiologija, 1957, No. 6, pp. 82-9, bibl. 6, illus.

Pot experiments with hemp showed that K deficiency decreased seed, and especially fibre, yields; male plants were affected even more than female plants. K application accelerated seed formation and reduced the growing period. The highest yields were obtained from male plants when K was applied before sowing and from female plants when K was applied at the third leaf stage.

2804. Melikjan, N. M.
Some characteristics of the male and female plants of hemp. [Armenian, with Russian summary.]
Nauč. Trudy Erovanskogo Un-ta, 1956, **54**: 45-52, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,257.

Work in Armenia has shown that lignification in male hemp plants proceeds more slowly than in female plants. At the end of the growth period the lignin content of male plants was 13–16% against 23–25% in the female. From this it is concluded that the better fibre quality of male plants is due to their low lignin content.

2805. Boyce, W. R.
Resistance to yellow-leaf disease in *Phormium tenax*. Forst. and the occurrence of delayed expression of symptoms.
N.Z. J. agric. Res., * 1958, **1**: 31-6, bibl. 3.

Resistance to yellow-leaf transmission has been found in a cultivar of *Phormium tenax*. Some evidence has been obtained that symptoms of yellow-leaf may not appear in some plants until 12 months after inoculation. Delay in symptom expression is associated with resistance, but the nature of the relationship is not known. —D.S.I.R., Christchurch.

Hops.

(*See also* 2839s.)

2806. D.S.I.R., N.Z., and Cawthron Institute.
Hop research. Annual Report for 1956-57.
[1957], pp. 2.

Hills left uncovered in spring produced only 56% the yield of plants covered with a shallow layer of soil soon after spring pruning. Yields were greatly reduced by defoliation. A 20% increase in yield was obtained with Fuggle by training 6 vines on 3 strings instead of 4 vines on 2 strings, but no yield differences were obtained with the vigorous variety Californian. Root-rot incidence has been reduced by the use of inorganic, rather than organic N, and of superphosphate. [See also abstracts 2807 and 2815.]

2807. Askew, H. O., Monk, R. J., and Watson, J.
Field and laboratory research on hops.
A.R. Cawthron Inst. 1956-1957, 1957, pp. 50-3.

Among results reported are the following: *Yield data:* No response to B was reflected in yield or in dry matter content of the cones; yields were reduced when K was omitted from a standard fertilizer treatment; dry matter contents and yields were increased by Mo applications. *Chemical data:* Leaf contents of K and N increased with an increase in fertilizer rate, but variations in cone contents were small; in a N-source experiment, the lowest N figures for leaf and cone were associated with casein applications. *Magnesium trials:* Increases in Mg contents of leaves and cones were induced on a sandy soil by dolomite and magnesite; Mn contents decreased as Mg contents increased in both leaves and cones. *Chemical changes in developing cones:* Contents of ash, including silica, and of total N and P fell appreciably as the flowers developed. *Sugar in roots:* Maximum figures for soluble carbohydrates were found in September, and minimum figures in December–January; water insoluble, but hydrolysable, carbohydrates were high when soluble carbohydrates were low, and *vice versa*.

2808. Davis, E. L.
Morphological complexes in hops (*Humulus lupulus* L.) with special reference to the American race.
Ann. Mo. bot. Gdn, 1957, **44**: 271-94, bibl. 23, illus.

A method for measuring variation between hops, based on leaf and cone characters, is described [see also *H.A.*, 27: 1677]. It has been applied to collections of cultivated plants, brewing samples and herbarium material. For each variety examined the measured characters have proved to be stable over a wide geographical area. This has made it possible to distinguish 3 morphological complexes among the cultivated hops, namely, one represented by English varieties, another by German-Czech varieties, and a third by the American variety Late Clusters. Hops presumed to be wild in the U.S.A., but which may include some escapes from cultivation, possess characters in common with Late Clusters and with Japanese wild hops. In some regions the wild American hops are uniform, but in the Southwest, where they are known to be indigenous, they are very variable. It is not, however, possible at present to set limits on the variation in the truly native American hops, which would exclude all hops of European origin. Until this can be done the name *Humulus lupulus* should, therefore, continue to be applied to all perennial hops.—Henry Shaw Sch. Bot., Washington Univ.

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* Formerly *N.Z.J. Sci. Tech., Sect. A.*

2809. Bell, P. R.
Twining of the hop (*Humulus lupulus* L.).
Nature, 1958, **181**: 1009-10, bibl. 2.

Observations on the twining of hop shoots suggested that in the first phase of growth the angle made by the gyres of the helix with the horizontal varies with the diameter of the support. This was confirmed experimentally and the relationship between the diameter of the support and the angle of the climbing stem is expressed mathematically. The physiology of shoot growth is discussed.—Bot. Dep., Univ. Coll., London.

2810. Bujnickij, N. A., Nalivajko, G. S., and Pročaev, V. P.
The effect of the conditions in which hop transplants are grown on their productivity. [Russian.]
Agrobiologija, 1958, No. 1, pp. 136-8.

Favourable nutritional conditions, and especially row applications of P, ensured good rooting of hop cuttings and high cone yields during the first year of cultivation. When cuttings were treated with cultures of *Bacillus mycoides*, *Sarcina flava* and *Azotobacter chroococcum*, the number of microorganisms in the rhizosphere increased greatly, and both root development and yields improved.

2811. Marocke, R.
Teneurs comparées en éléments nutritifs du houblon cultivé et du houblon sauvage. Bilan des exportations par le houblon en éléments fertilisants. Fumure phospho-potassique du houblon. **(Contents of nutrient elements compared in cultivated and wild hops. Balance in uptake of fertilizer elements by hops. Phospho-potassic manuring of hops.)**
Ann. agron., 1957, **8**: 689-93.

Investigations and experiments carried out at the Colmar Agronomy Station are summarized. Wild and cultivated hops were compared for contents of N, P_2O_5, K_2O and CaO. Fresh weight, dry weight and uptake of these 4 nutrients are given for whole plants and different parts of the plants, and show little variation for different fertilizer ratios of N : P : K. Leaf K decreased in young material at flowering but had increased again by harvest time to values higher than those found in May, possibly due to a change from drought conditions to rainy weather at flowering.

2812. Bondarenko, V. M., and Litvinenko, I. I.
The chemical composition of hop cones as affected by root and foliar nutrition. [Ukrainian, with Russian and English summaries.]
Dopovidi AN URSR, 1957, No. 1, pp. 67-70, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,441.

Foliar nutrition caused changes in the composition of hop cones, increasing the content of extractives, N and glucose, while reducing the amount of ash. The content of bitter principles was unaffected. Yields were usually higher than from soil applications.

2813. Nalivajko, Ju. S., and Karabanov, Ju. V.
The effect of manganese on the growth, development and yield of hops. [Ukrainian, with Russian summary.]
Dopovidi AN URSR, 1956, No. 5, pp. 494-7, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,442.

In pot and field experiments, conducted in 1954–55, Mn fertilizers produced better growth and development of hops, raised the ascorbic acid content and the catalase and peroxidase activity of leaves, and increased the intensity of metabolism and the synthetic activity. Both root and foliar applications of Mn increased yields.

2814. Legg, J. T., and Ormerod, P. J.
The nickel content of hop plants with reference to nettlehead symptoms.
A.R. E. Malling Res. Stat. 1957, 1958, **A41**: 129-32, bibl. 4.

The addition of 1 p.p.m. or more of nickel to Early Prolific hop plants grown in sand culture induced toxicity symptoms within 13 days. These symptoms were different from those caused by nettlehead virus. Nettlehead-infected Early Prolific plants developed typical disease symptoms when grown in sand culture with a low nickel content. Some of the heavy-metal contents of the leaf samples from these infected plants were significantly higher than those from healthy plants, and it is suggested that this is symptomatic of the disease. [Authors' summary.]

2815. Christie, T.
Effect of some major plant nutrients on resistance of hop plants to *Phytophthora cactorum* (L. and C.) Schroet.
A.R. Cawthron Inst. 1956-1957, 1957, pp. 34-5.

In a limited trial there were indications that NPK and NK applications to hop plants increased their susceptibility to infection by *Phytophthora cactorum*. The omission of K_2O and, to a lesser degree, of N appeared to check infection.

2816. Bailey, P. H.
Hop drying investigations. Part I. The performance of conventional 20 ft. square kilns with forced draught. [French, German and Spanish summaries 16 to 18 lines each.]
J. agric. Engng Res., 1958, **3**: 35-46, bibl. 17, illus.

The performances of 2 single-deck 20 ft. square kilns were measured in the 1956 and 1957 seasons. With a drying air quantity of 54,000 lb./hr. (velocity about 35 ft./min.), the loadings used were 3,000–5,000 lb. of wet hops and the specific evaporation ranged from 42 to 53 lb. of water per gal. of gas oil according to the size of loading. No differences were evident between the drying rates with machine-picked Wye-variety hops and hand-picked Fuggles after adjustment for the size of loading. It was found that Burgess's formula for the determination of drying time requires modification to give satisfactory results with 20 ft. square kilns. [From author's abstract.]—N.I.A.E., Wrest Park, Silsoe.

Insecticidal and rodenticidal plants.

(*See also* 2840c, 3174.)

2817. Delhaye, R. J.
Activités des centres d'essais sur pyrèthre du Kivu-Nord et du Ruanda. **(Activities of the North Kivu and Ruanda pyrethrum experimental centres.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 39-52, bibl. 1, illus.

Brief reports are given on: the interaction of climate and infection by *Ramularia bellunensis* as affecting yield of pyrethrum; selection; soil conservation and spacing; propagation by seed and by dividing plants; manuring.

2818. Jones, G. D. G.
A new pyrethrum drier.
Pyreth. Post, 1958, **4**(3): 15-18, bibl. 2, illus.

With an input temperature of 80° C. and high thermal efficiency this inexpensive drier produces 250 lb. of dried flowers in 24 hours.

2819. Bal, S. N., and others.
A note on red squill grown in India.
J. sci. industr. Res., India, 1957, **16C**: 156.

The behaviour of a few squill plants (*Urginea maritima*) has been studied under Indian conditions. Propagation by bulb segments was more rapid than with whole bulbs. Flowering was poor, but the glycoside contents of flowered bulbs were higher than that of bulbs which had not flowered.—Bengal Immunity Res. Inst., Calcutta.

Rubber plants.

2820. Nizkovskaja, E. K.
Gutta-vessels and gutta production of *Eucommia* in Tadžikistan. [Russian.]
Uč. zap. Tadž. Un-ta, 1956, **12**: 79-88, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,763.

As a result of comparative studies on *Eucommia* in Abhazia (humid subtropics) and Tadžikistan (dry subtropics) the effect of climatic conditions on the development of gutta vessels and the accumulation of gutta was established. The relative quantity of gutta (in mg. per unit leaf area) was greater in *Eucommia* grown in Tadžikistan than in that grown in Abhazia, which indicates an increased intensity of gutta synthesis under dry subtropical conditions. The absolute quantity of gutta (in mg. per leaf) was, however, smaller in Tadžikistan, as *Eucommia* being a hydrophilous plant produces flower leaves under these conditions. Optimum conditions for obtaining the greatest quantity of gutta appear to be high soil moisture, ensuring adequate leaf growth, with low relative humidity, which stimulates the biosynthesis of gutta.

2821. Usmanov, H. U., and Ganiev, B. Z.
The dynamics of gutta and resin accumulation in the leaves of *Eucommia* in Uzbekistan. [Russian, with Uzbek summary.]
Dokl. AN UzSSR, 1956, No. 9, pp. 17-21, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,473.

The gutta content of *Eucommia* increased gradually until the middle of September and then at a reduced rate until the end of November. The resin content remained practically unchanged throughout the season. The leaves of 2-year-old plants contained more gutta and resin than those of 5- and 30-year-old trees. To obtain high yields of gutta-percha it is suggested that *Eucommia* should be grown as bushes and cut down each year to ground level.

Seed and other vegetable oils.

(*See also* 2839f, o, q, 2840k.)

2822. Neustadt, M. H.
Rapid testing of oilseeds for oil quantity and iodine number of oil.
Tech. Bull. U.S. Dep. Agric. **1171**, 1957, pp. 26, bibl. 30, illus.

The dielectrometer method for quantity estimation is described for use with flax, soya bean, sunflower and safflower seeds. The use of a refractometer is also described for determining the iodine number as a measurement of degree of unsaturation of the glycerides.

2823. Kartha, A. R. S., and Sethi, A. S.
A cold percolation method for rapid gravimetric estimation of oil in small quantities of oil seeds.
Indian J. agric. Sci., 1957, **27**: 211-17, bibl. 8.

A 0·3 g. seed sample ground with 2 g. each of glass powder and anhydrous sodium sulphate and placed over a bed of sodium sulphate supported on cotton wool could be wholly filtered with petroleum ether. Evaporation of the ether solution at 95–100° C. was greatly accelerated by introducing 4 one-inch squares of filter paper for every 0·2 g. of oil present.

2824. Chowdhury, D. K., and Bagchi, R.
Composition of the seed fat of *Amaranthus gangeticus*.
Naturwissenschaften, 1956, **43**: 538, bibl. 3, [received 1958].

The seeds contained 4·17% of oil, in which the fatty acids were 37·53% linoleic, 56·18% oleic and 6·29% saturated.—Calcutta and Jadavpur Univs.

2825. Anon.
Monografía del arbol llamado vulgarmente cacay. **(Monograph on the tree commonly known as cacay.)**
Agric. trop. Bogotá, 1957, **13**: 774-5.

The fruit of *Caryodendron orinocense* contains an edible kernel resembling the European nut [cobnut?]. The kernel contains 70–80% of high quality oil. Bearing begins at 4–6 years of age, and at 10 years the yield is 150–200 kg. per tree. The wood makes good timber. The tree requires a moderate to clayey loam with a neutral reaction, an annual rainfall of 3–4 m., an average temperature at least 25° C. and spacing of 6–8 m. Nurseries are best established on sandy soil, and the trees are transplanted in late summer, having grown to 40–50 cm. high. Fruit is shaken from the branches onto cloths spread below.

2826. Leszczakówna, W., and Malinowski, B.
Nowa odmiana rącznika o niewysypujacych się nasionach (Rącznik No. 6). **(A new non-shattering variety of castor bean. (Castor bean No. 6.))**
Postępy Nauk roln., 1956, 3(1): 142-9, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,484.

The variety was developed in Poznan. The non-shattering character was found to be stable; plants with non-shattering seed in the F_1 generation amounted to 82%, in the F_2 to 92% and in the F_3 to 95·3%.

2827. Franzke, C.
Zur Kenntnis des Erdmandelöles. **(The nature of the oil of *Cyperus esculentus*).** [English summary.]
Fette, Seifen, Anstrichmitt., 1957, **59**: 328-9, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2311.

Oil from the tubers of *Cyperus esculentus*, cultivated in various parts of Europe, is edible, and has a high content of oleic acid. The oil content is low (10 to 17%) in proportion to other constituents, and large-scale exploitation is thus uneconomic. The tubers contain 36 mg. % of vitamin E, and 1·3 mg. % of total carotene.

2828. Chakrabarty, M. M., and others.
Studies on the seed fats of Cucurbitaceae family rich in conjugated acids. (The component fatty acids of *Momordica dioica* and *Trichosanthes cucumerina*.)
Naturwissenschaften, 1956, **43**: 523-4, bibl. 5, [received 1958].

Oil comprised 33·5% of the kernel or approximately 22% of the seed of *Momordica dioica*. Of this oil the composition was 27·1% saturated acids, 9·2% oleic acid, 8·8% linoleic acid and 54·9% conjugated triene. *Trichosanthes cucumeriana* seeds contained 28% oil, of which the acids were 11·87% saturated, 32·84% oleic, 19·83% linoleic and 35·46% conjugated triene.—Univ. Coll. Technol., Calcutta.

2829. Verheyden, J., and Delvaux, E. L.
Studie der mogelijkheden tot industriële verwerking der zaden van *Pentaclethra macrophylla*. **(Study of possibilities of commercial processing of seeds of *Pentaclethra macrophylla*.)** [French summary ½ p.]
Bull. agric. Congo belge, 1958, **49**: 23-50, bibl. 37.

Seed composition is given for the legumes *P. macrophylla* and *P. eetveldiana*. The embryos contain 45% and 50%, respectively, of owala oil, used locally and exported for soap manufacture. Details of physical and chemical characteristics are given for oil from these two sources. In some areas owala oil is processed for human consumption. The oil cake has high nutritive value, but its toxicity, due to the presence of the alkaloid paucine, has not yet been determined. The ash, containing considerable amounts of N, K, P and Ca, should be a valuable fertilizer for Belgian Congo crops.

2830. Tischer, J.
Über die Zusammensetzung von Perillaöl. **(The composition of perilla oil.)** [English summary.]
Fette, Seifen, Anstrichmitt., 1957, **59**: 313-18, *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2310.

Oil from the seeds of *Perilla ocimoides* is used for technical purposes and in the food industry. Data are presented concerning its composition and chemical characteristics. The oil has a high content of linolenic acid and low contents of oleic and linoleic acids.

2831. Daly, J. M., and Inman, R. E.
Changes in auxin levels in safflower hypocotyls infected with *Puccinia carthami*.
Phytopathology, 1958, **48**: 91-7, bibl. 24.

A quantitative comparison has been made of the auxin content of ether extracts from healthy and from rust-affected safflower hypocotyls at various stages of development. Bioassay of the chromatogram areas corresponding to the position of indoleacetic acid showed significantly greater growth-promoting activity in extracts from diseased tissue than in those from healthy tissue at all times during infection. Extracts obtained from diseased tissue before signs or symptoms of disease indicated the presence of other growth materials, possibly precursors of indoleacetic acid, but identification was not possible. Visual observations of chromatograms sprayed with *p*-dimethylaminobenzaldehyde suggested a correlation between development of the hypocotyls and the presence of indole compounds. Since excised safflower hypocotyls respond to indoleacetic acid by elongation in the same manner as intact hypocotyls respond to infection, the above evidence supports the hypothesis that higher auxin levels may be responsible for the initial increase in host growth and metabolism that occurs during infection by the rust fungus. Several mechanisms to account for the increased auxin levels and the possible significance of the findings for other obligate parasites are discussed. [From authors' summary. See also *H.A.*, 27: 3707.]—Univ. Neb., Lincoln.

2832. Desmarest, J.
Observations sur la population de karités de Niangoloko 1953 à 1957. **(Observations on the Niangoloko population of shea-butter trees 1953-1957.)**
Oléagineux, 1958, **13**: 449-55, bibl. 4, illus.

Studies on 217 unselected trees of *Butyrospermum parkii* showed that 24·4% of them were unprofitable and that 14·7% were regular producers. Heavy bearing trees tended to have stout trunks, globular crowns and dense foliage in which the minimum air temperature was 0·5–1·0° C. higher than in trees of sparse foliage. Soil type and total rainfall had no apparent influence on yield, but there was a close positive correlation between yield and the minimum temperature during the flowering period and consequently between yield and the date of flowering. It therefore appears possible to forecast the approximate crop size some 6 months prior to harvest.

2833. Bagot, Y.
Technologie du karité aux stades artisanal et semi-industriel. **(The technology of shea butter production at rural and semi-industrial levels.)**
Oléagineux, 1958, **13**: 375-84, bibl. 4, illus.

Equipment for drying, decortication and the extraction of shea butter suitable for a village industry and successfully introduced into parts of West Africa, particularly Dahomey, is described. The capacity and costs of this equipment and the packing and quality of the products are considered.

834. KNOEPFLER, N. B., AND VIX, H. L. E.
Review of chemistry and research potential of *Simmondsia chinensis* (jojoba) oil.
J. agric. Food Chem., 1958, **6**: 118-21, bibl. 22, illus.

he seed of jojoba, which is a wild desert shrub native o the southwestern United States and northern Mexico, ields 50% of a waxy oil, the characteristics of which re described. Problems of introducing the plant o cultivation are discussed.—S. reg. Res. Lab., .S.D.A., New Orleans, La.

Tannin plants.

(*See also* 2839l, 2840f.)

835. GRIFFIN, E. L., JR., TURKOT, V. A., AND ROGER, N. F.
Canaigre investigations. XII. Drying canaigre roots in a direct-fired rotary drier.
J. Amer. Leather Chem. Ass., 1957, **52**: 176-83, from *Publs Patents east. Utiliz. Res. Develop. Div., U.S. Dep. Agric.*, 1957, **ARS-73-6** (Suppl. 5), Abstr. 1081.

anaigre roots can be dried to a stable form in a rotary-pe, direct-fired, alfalfa drier. Root shreds dried to 2% moisture at an inlet air temperature of 900° F. howed no visible scorching or loss of tannin. The xtractability of the tannin from the dried roots was ubstantially the same as from sun-dried shreds.

836. OSSOWSKI, L. L. J.
Occurrence of strains of the nuclear polyhedral virus of the wattle bagworm.
Nature, 1958, **181**: 648, bibl. 1.

uring experiments to determine whether *Kotochalia oodi* could be controlled by artificially increasing the ncentration of polyhedral virus in plantations of *cacia mollissima* [see *H.A.*, 27: 3712q], it was found at a high rate of mortality due to polyhedrosis sulted in all cases. Virus obtained from local sources, wever, was less effective than that from distant urces, indicating a degree of resistance of the bagorm to the local virus and the existence of different rains within the virus.—Wattle Res. Inst., Univ. atal, Pietermaritzburg.

837. ČEVRENIDI, S. H.
A new tannin plant. [Russian.]
Izv. AN UzSSR, 1956, No. 7, pp. 89-90, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,263.

he leaves and roots of the willow herb, *Epilobium rsutum*, contain 5–18% tannins, up to 146 mg./% itamin C and the stems contain about 15% fibre.

Sundry plants.

(*See also* 2839t, x, 2840e, i.)

838. SINGH, S. N.
Studies in the floral biology of *Luffa*.
Hort. Advance, 1957, **1**: 86-94, bibl. 14, illus.
The study of seed content and fruit shape in relation to removal of stigma in *Luffa* species.
Curr. Sci., 1958, **27**: 143-4, bibl. 1, illus.

he first paper describes in detail what are believed to e the first studies undertaken on the floral biology of *L. cylindrica* and *L. acutangula*. The studies embraced flower structure, stages in the development of staminate and pistillate flowers, time of day at which the flowers open, anthesis as affected by temperature and humidity pollen viability and tube growth, stigma receptivity and the time taken to effect fertilization. The two species differed in several respects in their pattern of flower development.

The second paper describes reductions in seed content and a curved distortion of the fruits following removal of one or two stigmas prior to pollination.—Govt. hort. Res. Stat., Saharanpur.

Noted.

2839.

a AHTARDŽIEV, H.
Pharmacognostical characteristics of the *Digitalis* species growing in Bulgaria. [Bulgarian.]
Farmacija (*Sofija*), 1955, **5**(6): 25-31, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,898.
Digitalis ferruginea, *D. laevigata*, *D. ambigua*, *D. lanata* and *D. viridiflora* described.

b ALIM, A.
Fibre plant resources of East Pakistan.
Agric. Pakist., 1957, **8**: 360-70.
A useful list of 71 species with short notes on habit and uses.

c ALIM, A., AND SEN, J. L.
Investigation on the possibilities of cultivation of black pepper in East Pakistan.
Agric. Pakist., 1957, **8**: 277-80, bibl. 1.
A potentially valuable crop at present receiving little care.

d ALMIRANTE, B. A.
Selection and propagation of black pepper.
Phillip. Agric., 1955, **38**: 619-25, illus., [received 1958].
Cuttings with 7 nodes rooted first but 5-node cuttings produced most plants.

e ANON.
Sample surveys on pepper crop in Madras and Travancore-Cochin.
Statist. News Letter, 1957, **6**(4): 10.
For yield estimation.

f ANON.
Some straight facts about castor.
Indian Fmg, 1958, **7**(12): 6-9, illus.
Oil content and yield of improved strains, with notes on harvesting and pest control.

g BALIGUAS, C. N.
The variability of seven abacá varieties.
Philipp. Agric., 1955, **38**: 637-44, bibl. 3, illus., [received 1958].
Itom, Bulao and Puti the most promising.

h BARRAU, J.
Le *Duboisia myoporoïdes* R. Br., plante médicinale de la Nouvelle-Calédonie.
(*Duboisia myoporoides*, a medicinal plant of New Caledonia.)
J. Agric. trop. Bot. appl., 1957, **4**: 453-7, bibl. 6, illus.
A review; this species is abundant in New Caledonia.

i Bisset, N. G.
Cardiac glycosides, Part I. Apocynaceae: The genera *Carissa* L., *Vallaris* Burm. f., *Beaumontia* Wall., *Anodendron* A. DC., and others.
Idem, Part II. Moraceae: The genus *Ogcodeia* Bur. Idem, Part III. Moraceae: The genus *Antiaropsis* K. Schum.
Ann. bogor., 1957, **2**: 193-210, bibl. 39; 211-17, bibl. 10; 219-23, bibl. 6.
Cardiac glycoside contents reported.

Bócsa, I.
Nuovi metodi e risultati nel miglioramento genetico della canapa. **(New methods and results in genetical improvement of hemp.)** [English and German summaries 4 lines each.]
Sementi elette, 1958, **4**(2): 28-35, bibl. 13, illus.
Productivity and fibre quality of new hybrids.

k Bose, B.
A new method of assay of *Rauwolfia serpentina*.
J. Instn Chem. India, 1957, **29**(3): 166, from *Analyt. Abstr.*, 1958, **5**, No. 1331.
Higher contents of total alkaloids found by this assay than by the B.P.C. method.

l Čevrenidi, S. H.
***Ampelopsis vitifolia* as a tannin plant.** [Russian.]
Izv. AN UzSSR, 1956, No. 6, pp. 109-10, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,475.
The leaves contain over 30% soluble tannins.

m Dhingra, S. N., and Dhingra, D. R.
Essential oil of *Cyperus scariosus*.
Perfum. essent. Oil Rec., 1957, **48**: 112-16, bibl. 13.
Distillation procedure and physico-chemical constants.

n Elzenga, G.
Influence of external factors on the alkaloid content in some medicinal plants.
Pharm. Weekbl., 1957, **92**: 767-75, reprinted as *Meded. Inst. Vered. Tuinbouwgew.* **123**, 1958, pp. 8, bibl. 43.
A review, including short abstracts of 43 papers.

o FAO.
Fats and oils No. 7.
FAO Commodity Rep., 1957, pp. 58.
Upward trend in production and trade continued in 1956 and 1957.

p Gabra, S.
***Papaver* species and opium through the ages.**
Bull. Inst. Egypte, 1956, **37**(1): 39-56, bibl., from *Bull. sci. tech. Docum. Centre, Cairo*, 1956, Vol. **2**, Abstr. 101,038.
Historical survey, covering *P. rhoes* and *P. somniferum*.

q Giard, J.
Le ricin dans l'Union Française. **(Castor beans in France and French territories.)**
Oléagineux, 1958, **13**: 263-7, bibl. 2.
Including crop requirements and harvesting.

r Goss, R. C.
Studies on the control of verticillium wilt of peppermint with CBP-55.
Plant Dis. Reptr, 1958, **42**: 177-9, bibl. 2.
Satisfactory control by soil fumigation with CBP-55 at 80–120 gal./acre.

s Howard, G. A., and Slater, C. A.
The chemistry of hop constituents. Part XII. The structure of humulinone.
J. chem. Soc. Lond., 1958, pp. 1460-2, bibl. 6.

t Kramer, F. L.
The pepper tree, *Schinus molle* L.
Econ. Bot., 1957, **11**: 322-6, bibl. 40.
Mainly historical.

u Mackie, A., and Ghatge, N.
Chemical investigation of the leaves of *Anona senegalensis*. II. Carbohydrates, glycosides, proteins, amino-acids, sterols.
J. Sci. Food Agric., 1958, **9**: 88-92, bibl. 6.
For part I see *H.A.*, 26: 2948o.

v Mitra, C.
***Calophyllum inophyllum* Linn.: Part I—Chemical constituents of the nut oil and the stem bark.**
J. sci. industr. Res., India, 1957, **16B**: 120-4, bibl. 16.
The oil is used in indigenous medicine.

w Morgan, K. J., and Barltrop, J. A.
Veratrum alkaloids.
Quart. Rev. chem. Soc., 1958, **12**: 34-60, bibl. 128.
Alkaloids from *Veratrum*, *Zygadenus* and *Fritillaria* species reviewed.

x Narayanamurti, D., Rao, P. R., and Ram, R.
Adhesives from tamarind seed testa.
J. sci. industr. Res., India, 1957, **16B**: 377-8, bibl. 6.
Promising results obtained.

y Nikiforov, I. L.
Monoecious wild hemp in Azerbajdžan. [Russian.]
Priroda, 1958, **47**(3): 98-9, bibl. 4, illus.
In which seeds and stems mature at the same time and fibre quality is high.

z Orillo, F. T., and Romano, P. B.
***Helminthosporium* leaf spot of kapok.**
Philipp. Agric., 1955, **38**: 583-94, bibl. 2, [received 1958].
H. ceibae fully described; sanitation and seed disinfection suggested for control.

840.

a Parsa, A.
Contributions to the knowledge of useful plants and raw materials in Iran. II. Différentes espèces de manne de l'Iran. **(II. Different kinds of Persian manna.)**
Maveg., 1957, **2**: 292-7, bibl. 4.
From species of *Alhagi*, *Cotoneaster*, *Quercus*, *Tamarix*, *Salix*, *Echinops*, *Apocynum* and *Astragalus*.

b Penfold, A. R.
The essential oil industry (of Australia).
Australasian Mfr, June 1956, pp. 218, 221, reprinted in *Perfum. essent. Oil Rec.*, 1957, **48**: 59-61.
Notes on species and production.

c Phipers, R. F.
The analysis of pyrethrins. A review of recent publications.
Pyreth. Post, 1958, **4**(3): 3-7, bibl. 43.
Titrimetric, colorimetric, chromatographic and polarographic methods.

d Rabechault, H.
Note sur l'anatomie du vétiver de la Réunion et la recherche histochimique de l'essence. **(Note on the anatomy of vetiver from Réunion and a histochemical investigation of the essential oil.)** [English and Spanish summaries ¼ p. each.]
Agron. trop., 1958, **13**: 52-61, bibl. 29, illus.
Root and leaf structure, and oil distribution in the root.

e Regel, C.
Pistacia mutica F. et M. als Nutzpflanze. **(The uses of *Pistacia mutica*.)** [French summary 7 lines.]
Maveg., 1957, **2**: 350-6, bibl. 30.
Resin (turpentine), edible fruits, timber.

f Roux, D. G.
Biogenesis of condensed tannins from leucoanthocyanins.
Nature, 1958, **181**: 1454-6, bibl. 17, illus.
In *Schinopsis* and *Acacia* spp.

g Sacco, T.
Ricerche sulla *Cassia fistula* L. della Somalia. **(Studies on *Cassia fistula* in [Italian] Somaliland.)**
Riv. Agric. subtrop. trop., 1958, **52**: 119-23, bibl. 6, illus.
Including composition figures for the seeds and fruit pulp.

h Sahadevan, P. C., and Gopalakrishnan, R.
A new silk-cotton comes to town.
Indian Fmg, 1958, **7**(11): 31-2, illus.
A long-podded, early-bearing, dwarf variety of *Ceiba pentandra*.

i Salgues, R.
Copals en général et copals d'Afrique. **(Copals, with special reference to African products.)**
Maveg., 1957, **2**: 272-91, bibl. 11.
Copals from 33 African plant species examined.

j Scott, W. E., and others.
A survey of selected Solanaceae for alkaloids.
J. Amer. pharm. Ass., sci. Ed., 1957, **46**: 302-4, from *Publs Patents east. Utiliz. Res. Develop. Div., U.S. Dep. Agric.*, 1957, **ARS-73-6** (Suppl. 5), Abstr. 1103.
Two-thirds of 61 species examined contained alkaloids.

k Serry, M.
Castor beans. I. Effect of thinning and spacing between holes on the yield of seeds, 1954.
Egypt. agric. Res. Rev., 1957, **35**(3): 52-7, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,775.
Thinning to 3 plants per hole gave a 5% yield increase.

l Su, C.
The economic importance of *Althaea rosea* Cav. [Chinese.]
Shen-usjuě Tunbao, 1956, No. 11, pp. 32-3, from *Ref. Ž. (Biol.)*, 1957, No. 23, Abstr. 97,472.
Hollyhock stems contain 2·7% fibre used in China for rope and sack making.

m Tucakov, Y.
Contribution to the study of the fruit and essential oil of the Jugoslav coriander.
Perfum. essent. Oil Rec., 1957, **48**: 212-16, bibl. 5, illus.
Cultivation, selection, distillation and physico-chemical constants.

n Williams, L. O.
Ginseng.
Econ. Bot., 1957, **11**: 344-8, illus.
Panax spp.; a short historical account with views on market prospects.

FLORICULTURE.

General.

See also 2079, 2080, 2083, 2125, 2131, 2146r, 2449g, 944n, u, z, 2945j, 2953, 3193, 3202, 3209.)

841. Société d'Horticulture Pratique de Nice et des Alpes-Maritimes.
Jardins de la Côte d'Azur. **(Gardens of the Côte d'Azur.)** [Brief English and German summaries.]
Monogr. hort. XV^e Congr. int. Hort., Nice, 1958, pp. 130, illus.

The largest section of this beautifully produced monograph, published on the occasion of the 15th International Horticultural Congress, deals with ornamental plants and comprises 16 articles, each by a different author, 7 covering famous gardens of the region and special types of garden plants, and 9 dealing with commercial floriculture. These articles include: ornamental trees and shrubs, bedding plants and lawns, cacti and succulents, climbers, little-known ornamentals, carnations, roses, mimosa (Acacia), bulbs, asparagus fern, house plants, floral decoration, transport and export. In addition, the introductory articles concern climate and soils, and later sections include olives, citrus, pome and stone fruits, vegetables, perfume plants, the Provence Research Centre and the Antibes Horticultural College, and finally co-operative societies.

2842. Kellogg, C. E.
Home gardens and lawns.
Yearb. Agric. U.S. Dep. Agric. 1957, pp. 665-88.

Advice is given on tillage, organic amendments, compost making, pH regulation and requirements of various ornamentals and vegetables, fertilizing, lawn establishment and management.

2843. Teuscher, H., Nelson, P. K., and others.
Gardening in containers.
Plants and Gdns, 1958, **14**: 4-80, illus.

All the articles in this number of the journal are concerned with growing plants in various kinds of container, chiefly for ornamental purposes. The main emphasis is on roof gardens and window boxes, but their use in the houses is also considered. The many materials that can be used as containers are described. Vegetables may be grown without soil in flat containers or in vertical "moss walls".

2844. Mahlstede, J. P.
Test container stock for mail orders.
Amer. Nurserym., 1958, **107**(8): 14-15, 134-43, illus.

Observations are made on the following aspects of growing and shipping ornamental stock plants in containers: growing media (particularly perlite mixtures), feeding, accumulation of salts, forcing, field performance after planting, packing and economics.

2845. Silberschmidt, K.
Periodicidade anual da germinação de sementes no Brasil. (**Annual periodicity in germination of seeds in Brazil.**) [English summary 2 pp.]
An. Acad. bras. Cienc., 1956, **28**: 545-69, bibl. 16, [received 1958].

A study was made of the germination capacity, over a number of years, of the seeds of many ornamental plants, including *Hedychium gardnerianum*, *Leonorus sibiricus*, *Cyperus luzulae* and several *Solanum* species. In many cases there were monthly fluctuations in germination capacity which followed an annual rhythmic pattern. No fundamental differences were observed between the results of germination tests made in light and in darkness.—Inst. biol., São Paulo.

2846. Holt, J.
A simple way of grafting herbaceous plants.
Gdnrs' Chron., 1958, **143**: 332, illus.

Stocks and scions of *Lathyrus* spp. were sliced diagonally and the grafts joined and kept rigid by means of short lengths of polythene tubing. Union usually occurred 10 to 12 days after grafting.—Dep. Bot., Univ. Manchester.

2847. Reeker, R.
Versuche mit Düngetorf als Kultursubstrat für Zierpflanzen. (**Studies with peat as a cultural medium for ornamental plants.**) [Russian and English summaries ¼ p. each.]
Arch. Gartenb., 1957, **5**: 79-103, bibl. 22, illus.

High-moor or sphagnum peat has been tested as a medium for ornamental pot plants. Lime must be added to the peat, and a rate of 1·5 g. CaO per litre of loosened peat was the most satisfactory. A complete fertilizer should also be added, at a rate of 1·5 g. for young plants, and 3 g. for older plants. The best complete fertilizers were chloride-free and contained micronutrients. When pots are sunk in peat, this peat should also be given supplementary lime. Pot plants used in the tests were calceolaria, cineraria, primula, begonia and cyclamen.—Versuchsgärtn., Torfforsch., Bad Zwischenahn.

2848. Anon.
Sub-irrigation of pot plants.
Univ. Calif. Flower Notes, 1957, No. 24, from abstr. in *Bull. N.Y. St. Flower Grs*, 1958, No. 145, p. 7.

Wooden benches were lined with polythene and a layer of gravel placed in the bottom, on which pots of African violets were placed. The benches were filled to just below the lip of the pot with water, which was allowed to stand for 20 min. before draining. Frequency of watering and labour requirements were much reduced by sub-irrigation.

2849. Jacobs, A., Taveirne, W., and Peeters, F.
Le chauffage électrique du sol en horticulture.) (**Electrical heating of soil in horticulture.**)
Rev. Agric. Brux., 1958, **11**: 35-76, illus.

Installations with cables are compared with those with wire netting. In experiments with a cable installation begonia cuttings rooted well at a soil temperature of 22·5° C., but most of those at 25° C. had scorched rootlets. At either temperature, however, results were better than in the controls, where soil temperature varied between 19 and 20° C. Cuttings of *Areopanax reticulata* rooted well in soil heated by netting to 25° C., but 28° C. was too high, particularly for young material. With a cable system on a greenhouse propagating bench, leaf cuttings of *Ficus decora*, in pots sunk in a layered peat/sand medium and covered with cloches, rooted far more successfully at a soil temperature of 31° C. than at 28 or 25° C. With all 3 species the use of electric soil heating was highly economic.—Stat. Génie rural État, Lemberge.

2850. Aytoun, R. S. C., and Hey, G. L.
Gibberellins can help you—and this is how.
Grower, 1958, **49**: 416-21, illus.

A review of recent work is supplemented by a short account of experimental results from the Glaxo Laboratories. No transplanting setback was suffered by *Asclepias* when sprayed with 1 ml. of 10 p.p.m. gibberellin at potting and 1 week later. Untreated seedlings grew more slowly. *Schizanthus* was very sensitive in the seedling stage, 1 p.p.m. being sufficient at transplanting to avoid a growth check. Older plants were improved by a 10 p.p.m. spray. *Primula obconica* and balsam plants also benefited by this treatment. Geraniums responded best when the spray (5–10 p.p.m.) was confined to flower heads and applied at the first sign of colour in the buds; larger and more lasting flowers resulted. Spraying the whole plant tended to delay flowering. *Crassula arborescens* treated twice with 0·5 ml. of 10 p.p.m. gibberellin roduced much longer internodes than without treatment. *Saintpaulia* showed marked elongation of flower scapes and petioles after 6 treatments with 0 p.p.m. gibberellin, but fewer treatments or a reduced dosage would be advisable for commercial use.—Glaxo Labs, Stoke Poges, Bucks, and Murphy chem. Co., Wheathampstead, Herts.

2851. Itakura, T., Shiraki, Y., and Shiraki, S.
Effects of gibberellin on the growth and flowering of several ornamental plants. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 236-42, bibl. 20, illus.

Single or repeated doses of gibberellin at 20, 40 or 50 p.p.m. were sprayed on several ornamental plants. Flowering of cyclamen was accelerated, accompanied by an increase in flower size and stem length. Flowering of freesias was also accelerated, but only in plants with fairly advanced flower buds. Plant height and shoot length of petunias were markedly increased. The effect of gibberellin on accelerating flowering of Daphne became apparent 1 week after treatment. With sweet peas flower size and length of flower stem were increased. No response to the sprays was observed in *Prunus yedoensis* or *Spiraea thunbergii*, but when budded twigs were cut and placed in gibberellin, bud sprouting was hastened and the length of flower stems increased. Gibberellin had little effect on potted Kurume azaleas or on *Prunus mume*, peach and Japanese cherry in the field.

2852. Hårdh, J. E.
Gibberelliini lisää kasvien pituuskasvua. (**Gibberellin stimulates elongation of plant stems.**) [English summary 7 lines.]
Puutarha, 1958, **61**: 14-15, illus.

Potted chrysanthemum plants were treated weekly for weeks, beginning 28 Aug., with 25 or 50 mg./l. of gibberellin. By 2 Oct. the controls had made 57 cm. growth, the plants which received 25 mg./l. GB had made 80 cm. and those receiving 50 mg./l. 86 cm. Geraniums made 3·8 cm. growth when untreated, 5 cm. when treated with 50 mg./l. and 4·1 cm. when treated with 100 mg./l. Azaleas treated with 50 mg./l. made 3·3 cm. growth compared with 2 cm. made by control plants. There was no visible response in Rhododendron, *Santolina* or cyclamen.

2853. McVey, G. R., and Wittwer, S. H.
Gibberellin and higher plants: XI. Responses of certain woody ornamental plants.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 679-97, bibl. 10, illus.

Thirteen woody ornamental species were selected on the basis of foliage type (deciduous or evergreen), growth habit, time of flowering and commercial importance, and various gibberellin treatments were applied. Several species showed marked stem elongation, an increase in node number, continuous growth of shoots, and a succession of growth flushes from otherwise dormant shoots. Growth increases in some species resulted from an extended period of growth, while in others it was the result of longer internodes and a succession of growth flushes from otherwise dormant buds. Shoot growth was greatest in plants which responded to gibberellin during normal vegetative extension in the spring. The leaves of plants sprayed weekly with 10 or 100 p.p.m. or once with 1,000 p.p.m. were smaller than those of control plants. Leaf size was increased in plants sprayed once with 10 p.p.m. Possible uses of gibberellin treatments in the culture of ornamental plants are suggested.

2854. Lockhart, J. A., and Bonner, J.
Effects of gibberellic acid on the photoperiod-controlled growth of woody plants.
Plant Physiol., 1957, **32**: 492-4, bibl. 10.

Dormancy due to short-day conditions was broken in *Camellia japonica* by periodic applications of gibberellic acid, but this treatment had no effect on the dormancy of *Pinus coulteri* or *Pseudotsuga macrocarpa*, which also require long days for vegetative growth.—Calif. Inst. Tech., Pasadena.

2855. Hitchcock, A. E., and Zimmerman, P. W.
Toxic effects of vapors of mercury and of compounds of mercury on plants.
Ann. N.Y. Acad. Sci., 1957, **65**: 474-97, bibl. 14, illus.

Following an extensive review of the literature, the authors describe in detail the toxic effects of vapours of mercury and of compounds of mercury on Better Times roses. Injuries caused to tomato, mint and privet plants are mentioned briefly. Among the conclusions reached are that roses and other plants are subject to injury when exposed to either mercury vapour or mercury compounds, especially when the latter are mixed with organic matter occurring in soils and in paints. The extent of the injury varies with the species and variety and with temperature and other factors which affect vaporization of mercury. In roses the leaves may be more sensitive than the flower buds. Paint films containing a mercury fungicide continue to release mercury for at least a year, but this release can be largely prevented for periods of at least 5 months by brushing lime-sulphur paste over the mercury paint. The rate of recovery of injured rose plants may vary from less than 6 weeks to several months depending on the amount of injury. Evidence on the extent to which mercury is translocated from injured leaves to new shoots, which develop after the removal of the plants to a normal atmosphere, is inconclusive, but it has been shown that when only part of a plant is exposed to toxic amounts of mercury vapour the remainder of the plant shows no signs of injury.—Boyce Thompson Inst. Plant Res., Yonkers, N.Y.

2856. Koek, P. C.
Enkele nieuwe bestrijdingsmogelijkheden in de sierteelt. (**Some new control methods in growing ornamentals.**)
Tijdschr. PlZiekt., 1958, **64**: 121.

Control of foot rot (*Fusarium oxysporum* and *Verticillium dahliae*) in gerberas was obtained by soil fumigation with vapam at 100 ml. per m². *Botrytis cinerea* in cyclamen was effectively controlled by B.500 (active material is a halogen oxyquinoline derivative), dusted on the plants once a week. Treatment of *Erica gracilis* cuttings, and of gerbera plants with B.500 was also successful. Regular sprays of streptomycin sulphate have successfully controlled mildew on glasshouse roses.

2857. Kerr, S. H., and McElwee, E. W.
Further studies of the phytotoxicity of pesticides to ornamental plants.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 379-80, bibl. 2.

Foliage sprays of parathion and malathion and soil treatments of dieldrin and heptachlor were applied at recommended concentrations to 20 ornamental species. No symptoms of phytotoxicity were observed.—Fla agric. Exp. Stat., Gainesville. [For earlier work, see *H.A.*, 27: 2681.]

2858. Birchfield, W., and van Pelt, H. M.
Thermotherapy for nematodes of ornamental plants.
Plant Dis. Reptr, 1958, **42**: 451-5, bibl. 29, illus.

In laboratory tests hot-water treatment (50° C. for 2½ min.) destroyed spiral nematodes (*Helicotylenchus multicinctus*), while exposure for 4 min. destroyed *Meloidogyne incognita*. A high degree of control of *M. incognita* in several ornamentals was obtained by treatment for 10 min. at 50° C. The degree of plant tolerance to hot-water treatment is tabulated. The treatment was successful with sansevierias and philodendrons on a commercial scale, but not with caladiums. Preliminary tests have indicated that 15 min. at 50° C. plus a 1 : 100 solution of commercial formalin may give satisfactory nematode control in caladiums.—St. Plant Bd Fla, Gainesville.

2859. Aarts, J. F. T.
Over de houdbaarheid van snijbloemen. **(Keeping quality of cut flowers.)** [English summary 2 pp.]
Meded. LandbHogesch. Wageningen, 1957, **57**(9): 1-62, bibl. 125, illus.

Vessel plugging in cut stems is increased by aeration of the water and by damage to the stem caused by boiling. Plugging may be reduced by removing the air in the stem by vacuum treatment, by placing the stems in deep water, by reducing the pH of the water to ±3·5 and by the addition of calcium nitrate, sodium azide 2,3-dinitrophenol or malachite green. It is concluded that vessel plugging results from secretions from disorganized cells, being oxidative and probably dependent on phosphorylation processes. Light improves the keeping quality of dahlia, pyrethrum and stock flowers when leaves are present and their transpiration is not inhibited; sugar can replace light plus leaves, and at high concentrations sugar decreases stomatal transpiration and water uptake. Oxygen uptake decreases after cutting, but this effect may be reduced or even reversed by the addition of sugar. With carnations the sudden increase in O_2 uptake, which occurs when the flowers start to wilt, may be delayed or even prevented by high sugar concentrations. Oxygen uptake decreases during flower development with many species, but the sugar requirement is always correlated with rate of respiration. A decrease in O_2 uptake with longer flower life was only obtained by gibberellic acid in the case of stock flowers and by boric acid with flowers and detached petals of *Dianthus plumarius*. Boric acid only extended flower life and reduced sugar requirements in the case of *Convallaria*, *Dianthus* and *Lathyrus*. Boron affected the dry weight distribution in the floral organs of *Dianthus*, and prolonged the life of isolated flower petals. In general, the effect of various sugars was similar; low concentrations of lactose and maltose proved useful for dahlias and roses. *Dianthus* species responded better to maltose than to saccharose, but mannose was always harmful. The initially harmful effect of high concentrations of urea on dahlias became beneficial with time, provided that enough sugar was added. [For other results see *H.A.*, 28: 664.]—Lab. Tuinbouwpl. Wageningen.

2860. Meeus, M.
Keeping quality of cut flowers in water. [Flemish.]
Tuinbouwber., 1957, **21**: 93, from abstr. in *Informationsdienst Weihenstephan*, 1958, No. 1, p. 3.

The keeping quality of Mona Davis chrysanthemums was improved by immersing the bases of the stalks for 10 seconds in water at a temperature of 100° C. before wrapping in tissue paper. Forsythia cut in January or February came into full bloom after dipping the stems for 10 seconds in water at 40° C. Carnation flowers lasted 5 to 7 days longer after adding boric acid to the water. The tulip Princess Elizabeth lasted longer when cut just when the colour appeared in the buds.

Annual and herbaceous plants.

(*See also* 2069, 2091, 2099, 2102, 2112, 2115, 2124, 2944b-d, f, q-s, 2945h, m, n, u, 3184, 3187, 3190.)

2861. Mastalerz, J. W.
Trace element mixtures—their effect on floral crop growth.
Flor. Exch., 1958, **130**(10): 30, 50.

Relatively large amounts of trace element mixtures were applied to a well-drained soil compost without being toxic to chrysanthemums, snapdragons and carnations, but no improvement in growth was observed in cases in which no trace element deficiencies had occurred. An increased rate of calyx splitting in carnations was associated with boron deficiency [see also abstract 2866].—Pa St. Univ.

2862. Zabka, G. G.
The effect of light conditions, temperature and growth regulators on photoperiodism of *Amaranthus caudatus* L.
Diss. Abstr., 1957, **17**: 2400, being *Publ.* 23,411 of 246 pp.

Amaranthus caudatus was found to require short days for inflorescence development. Light intensity, light quality and the duration of light exposure all affected the photoperiodic response. Temperature was also an important factor and altered the time of inflorescence initiation and subsequent development of plants under both long- and short-day conditions. Interruption of the long dark period induced flowering of *Hyoscyamus niger* and inhibited flowering of *Amaranthus caudatus*. IAA at 100 mg./l. inhibited flowering and at 0·1 or 0·0001 mg./l. promoted flowering in *Amaranthus* plants on inductive short photoperiods. No concentrations of TIBA used prevented flowering but concentrations below 1 mg./l. were most effective in promoting inflorescence development. Neither IAA nor TIBA was effective in inducing inflorescence initiation in plants growing in non-inductive long photoperiods. Gibberellic acid had no effect on inflorescence initiation r development of *Amaranthus* or *Hyoscyamus* plants in long photoperiods, but at 100 mg./l. it delayed flowering in *Amaranthus* and induced stem elongation and flower bud formation in *Hyoscyamus* plants growing in short photoperiods.—Univ. Illinois.

2863. Nakasone, H. Y., and Kamemoto, H.
Carnation culture (with emphasis on vegetative propagation and effects of time of planting and mulching on flower production.)
Bull. Hawaii agric. Exp. Stat. **112**, 1957, pp. 15, bibl. 2, illus.

Results of rooting carnations in boxes and under intermittent mist are reported. The rooting of cuttings in boxes varied according to the season, but in general rooting during the cooler months was better than in the warmer summer months. Under intermittent mist rooting percentages of over 90% were obtained irrespective of season, and root quality was better than under normal rooting conditions. In a trial comparing different dates of planting the best yields were obtained from June planting. The results suggested that flowering during the winter is unlikely to be considerable. There were no differences in yields or in plant mortality between mulched and unmulched beds, and the extra cost of mulching cannot be justified.

2864. Messing, J. H. L.
Mineral nutrition of carnations.
J. Sci. Food Agric., 1958, **9**: 228-34, bibl. 25, illus.

Following a review of the literature, an account is given of experiments in which both young and mature plants of 3 carnation varieties were grown in sand culture. The symptoms produced by deficiencies of N, P, K, S, Mg, Ca and B are described. The absence of Mn, Fe and Zn from the nutrient solution produced no visible symptoms, although where Fe was omitted the number of blooms was reduced. There was no evidence that lack of any particular nutrient affected the incidence of calyx splitting. Evidence from other investigations supports the view that splitting may be increased by high P and reduced by high N, but it would appear that the main factors involved are hereditary and climatic.—Glasshouse Crops Res. Inst., Rustington, Littlehampton.

2865. (Lunt, O. R., Kohl, H. C., Jr., and Kofranek, A. M.)
Carnation production reduced by low salt concentrations.
Flor. Exch., 1958, **130**(8): 15, 48.

Increasing concentrations of calcium and sodium chloride substantially reduced production of Sim carnations. Production was reduced at relatively low salt concentrations. Quality also decreased gradually but still remained of commercial grade at high salt concentrations.—Univ. Calif., Los Angeles.

2866. (Mastalerz, E., and Campbell, F.)
Carnation splitting corrected by boron.
Florogram, reprinted in *Flor. Exch.*, 1958, **130**(10): 50.

Calyx splitting in carnations may be reduced by preventing night temperatures from dropping below 50° F. Studies have shown that splitting increases as the soil content of B decreases. Constant use of fortified fertilizers has been found to maintain adequate levels of B.—Waltham Field Stat., Univ. Mass.

2867. Tinga, J. H.
Production of greenhouse flowers.
Res. Rep. Va agric. Exp. Stat. 1953-1957, 1957, pp. 227.

Calyx split in carnations was shown to be related to light intensity and temperature. When the outside temperature was low and the light intensity was high the fresh weight of the flowers and the number of split flowers increased. The rupture occurred at 55° F. about 7–10 days before harvesting. Higher temperatures reduced calyx splitting but also reduced flower quality.

2868. (Petersen, J. L., and Skiver, R.)
Pano-drench combats *Fusarium* stem rot.
Flor. Exch., 1958, **130**(8): 49.

Fusarium stem rot and bacterial wilt (*Pseudomonas caryophylli*) were controlled by dipping carnation cuttings in Panodrench 4. Sprays of Omadine 1483 applied to mother blocks also controlled *Fusarium* stem rot and improved the rooting of cuttings taken from the sprayed plants.—Colo. A and M Coll., Denver.

2869. Webster, A. B.
Cultural techniques and the economics of late flowering chrysanthemums.
Res. Bull. W. Scot. agric. Coll. **21**, 1957, pp. 17.

The effects of various cultural techniques on the flowering of late chrysanthemum varieties are reported. Plants in pots produced more flowers per plant than did "lifters", and were more profitable when the same number of plants were grown per unit area. Flower number was increased by growing 2 plants per plot, but flowering was later. With "lifters", directly-lifted plants flowered earliest and had the shortest flowering season and the shortest stems. Plants grown in wire baskets for lifting had a later, but longer, flowering season and the longest stems. Flowering may be controlled by planting density. The density of "lifters" giving the highest yields was about 21 plants per sq. yd. The highest possible density of pot plants (9 pots per sq. yd.) always gave the highest yields.

2870. Kallauch, W.
Biohum-Versuch zu Chrysanthemen.
(Biohum studies with chrysanthemums.)
Gartenwelt, 1958, **58**: 136-7, illus.

Various levels of Biohum [a peat/soil mixture] were mixed with the soil before potting chrysanthemums. The best improvements in yields were obtained with 8 and 16 kg. levels; higher amounts gave no further improvement in yield.—Höhere Gartenbauschule, Osnabrück.

2871. Woltz, S. S.
Nitrogen and potassium fertilization of potted chrysanthemums.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 346-50.

Supplies of N and K were given in liquid or in slowly-available forms to potted chrysanthemums. Ammonium nitrate was the best of the soluble materials tested, and the recommended rate of weekly application is ½ g. per 6 in. pot. Of slowly soluble forms Dura-K was the most promising, and a rate of 3–6 g. per pot is recommended. Uramite and similar urea-formaldehyde fertilizers may be useful as a nitrogen source, but their use is limited by the irregular release of N.—Gulf Coast Exp. Stat., Bradenton.

2872. Cathey, H. M., and Borthwick, H. A.
Photoreversibility of floral initiation in chrysanthemum.
Bot. Gaz., 1957, **119**: 71-6, bibl. 7, illus.

Light radiation treatments, which were of 8 days' duration, were preceded and followed by non-inductive photoperiodic conditions. In most experiments the treatments consisted of brief irradiations with red or far red or both, near the middle of the dark period, and the plants were dissected 2 weeks later to observe their flowering condition. The stage of floral initiation was designated by numbers from 0 to 10, 0 representing a vegetative condition of the terminal meristem, and 10 the most advanced condition, in which perianth primordia were present on all florets. Dissection results were found to agree very closely with macroscopic observations made on other branches of the same plants after the plants had developed for several weeks after the light treatments. Floral initiation was markedly reduced by 1 minute of filtered red light from an eighteen-tube fluorescent light source and in most experiments was completely inhibited by 16 or 27 minutes. Floral initiation was re-promoted in many varieties by a few minutes of far-red radiant energy from incandescent lamps equipped with appropriate filters. Repeated alternations of red and far-red radiant energies resulted, respectively, in repeated inhibition and re-promotion of floral initiation. If the far-red treatment was separated from the red treatment by a dark interval, re-promotion of floral initiation became less as the duration of darkness increased. Little effect was usually found for 15-minute dark periods, but reversal failed almost completely if the dark period was as long as 90 minutes. Far red alone or following a brief red treatment inhibited flowering when the duration of far-red treatment was about 81 minutes. The practical and theoretical significance of the results are discussed. [From authors' summary.] —Agric. Res. Serv., U.S.D.A., Beltsville, Md.

2873. Reisch, K. W., and Kiplinger, D. C.
Effects of far-red light noted on greenhouse chrysanthemums.
Ohio Fm Home Res., 1957, **42**: 80-1, illus.

The exposure of Jewell chrysanthemum plants to red light from incandescent lamps for 10 minutes during the dark period did not prevent flower formation, but it markedly delayed flower development and reduced flower size. These effects were reversed when the plants were exposed to far-red light for 3 or 15 minutes immediately after the red-light treatment, but not when they were exposed for 45 minutes [see also *H.A.*, 27: 3733]. Although the use of far-red light to promote flower formation is unlikely to obviate the need for short-day treatment, it is considered sufficiently promising to warrant further investigation.

2874. Sheehan, T. J., and Teas, H. J.
Preliminary photo and chemical studies on floral induction in chrysanthemums.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 398-402, bibl. 17.

Far-red light treatments did not induce flowering or increase the number of crown buds in 2 chrysanthemum varieties growing in long days, but 5 min. of far-red light applied 15 min. after dark, resulted in earlier flower initiation in one variety. Twenty chemicals were also applied as sprays to plants that were: (A) exposed to long days only; (B) exposed to 4 short days, then sprayed, then given 66 long days; (C) exposed to 4 short days, then sprayed, then given 66 short days; (D) exposed to 8 short days, then sprayed, then given 62 long days; and (E) exposed to 8 short days, then sprayed, then given 62 short days. The number of crown buds in A and B plants and the number of flowers in C and E plants were reduced by 40 p.p.m. 2,4-D. MH at 0·1% and 2,4,5-T at 200 p.p.m. had similar effects, but also reduced crown bud formation in D plants. IAA at 200 p.p.m. reduced crown bud formation in A and B plants, but had no effect on flower numbers in the C and E plants.—Fla agric. Exp. Stat., Gainesville.

2875. Wolf, B.
The possible use of gibberellins as a substitute for artificial light in growing chrysanthemums.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 352-4, bibl. 2.

Rooted cuttings of chrysanthemums were treated in mid-October with 3 levels of gibberellic acid, which caused some increase in stem length. The effect of GA decreased with time, and by Christmas the treated plants were shorter and less vigorous than plants which had had supplementary light from mid-October to mid-November.—Dr. Wolf's agric. Lab., Hollywood.

2876. Cathey, H. M.
Chemical control of plant growth.
Bull. Pa Flower Grs, 1957, No. 82, from abstr. in *Bull. N.Y. St. Flower Grs*, 1958, No. 145, p. 7.

Gibberellic acid induces elongation of chrysanthemum plants when applied at any time during growth. The period of greatest elongation in a 9–10-week variety was in the third week after the start of short days. For elongation of the peduncles the plants were most sensitive to treatment in the fourth week after the start of short days. When it was applied in the seventh week of short days gibberellic acid accelerated floret development. Quaternary ammonium compounds inhibited elongation and proved useful for keeping pot chrysanthemums short.

2877. Cathey, H. M.
Chemical produces compact mum plants, retarding elongation without injury.
Flor. Exch., 1958, **130**(18): 13, 17, bibl. 2, illus.

Varietal effects in growth retardation and time taken to flower were observed when the basal ends of rooted chrysanthemum cuttings were treated with 3 levels of Amo-1618 (a quaternary ammonium compound) for 24 hours at 50° F. Flowering was delayed in proportion to growth retardation. There was no difference between treatments applied before or after rooting. At 85° F. only 25 p.p.m. of Amo-1618 was necessary to reduce stem length by 4–5 in., while at 50° F. a rate of 250 p.p.m. was required. Soil and foliage applications induced results similar to those obtained when pplications were made to cuttings, and no phytotoxic ffects were observed. Higher concentrations were equired with soil applications than with applications o growing points. The possibilities of using Amo-1618 n commercial practice are discussed. Agric. Res. erv., U.S.D.A., Beltsville, Md.

878. Osborne, P.
Do you know how serious stool miner is?
Grower, 1958, **49**: 870-1, illus.

xperimental work on chrysanthemums at the Edinburgh and East of Scotland College of Agriculture has hown that a soil application of 0·05% dieldrin, aldrin r lindane at the rate of ⅛ pint per plant within 7 days f planting out will keep plants free from attack by *Psila nigricornis* throughout the growing season.

879. Kelsheimer, E. G., and Overman, A. J.
Nematodes affecting Florida chrysanthemums and their control.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 350-2.

oil inhabiting nematode species and their control by hemicals or by steam sterilization are described. Among chemicals applied to the soil against nematodes, ethyl bromide, Crag Mylone and Vapam gave xcellent control, which was reflected in the weight of tems and roots of 3 chrysanthemum varieties planted ubsequently in the treated plots.—Gulf Coast Exp. tat., Bradenton.

880. Ignat'eva, I. P.
Vegetative regeneration of delphinium.
[Russian.]
Doklady Mosk. s.-h. Akad. im. K.A. Timiryazeva, 1956, No. 25, pp. 102-9, from *Ref. Ž. (Biol.)*, 1957, No. 20, Abstr. 86,068.

egetative regeneration was studied in 1- to 4-year-old eedlings of delphinium (*D. cultorum* Voss., *D. ybridum* Hort.). The dormant buds contain only art of the next season's vegetative organs, hence luring the growth of the annual shoots the formation f new leaves and inflorescences proceeds simulaneously with the unfolding of existing leaves. From he dormant buds shoots with a short cycle of developnent (3–3½ months) or with a normal cycle (6–6½ nonths) develop, the proportion of each depending on he date of planting. The majority of the shoots are nonocyclic. The number of dormant buds capable of egeneration increases up to the third year and then leclines. The reduction in later years in the number f these buds and in the proportion which develop into nnual shoots and also the reduced amount of shoot rowth appear to result from the natural ageing of the lant.

881. Stinson, R. F.
Gerbera flower production under several day lengths.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 393-6, bibl. 8.

lants of 2 clones of *Gerbera jamesoni* were subjected o 16-, 12-, 8-hour and normal daylengths. All treatnents produced the same quantity of flowers, except hat one of the varieties, Turkey Red, produced fewer flowers in the 12-hour day length. Plants grown in 8-hour days had shorter leaves and were smaller in size.

2882. Miller, R. O.
50° for snapdragons?
Bull. N.Y. St. Flower Grs, 1958, No. 145, pp. 1, 8.

In a series of temperature control experiments snapdragon plants were subjected to 40°, 50° and 60° F. night temperatures depending on the light intensity during the preceding day. Plants which had been kept for some nights at 60° F. flowered 2 weeks earlier, but were smaller, than plants which had been kept at 50° F. or below. Little or no increase in size or quality resulted from applying 40° F. night temperatures following dull days, as compared with growing the plants continuously at 50° F. regardless of light intensity. When small plants were grown at temperatures between 50° and 80° F. for 2–4 weeks before benching at 50° F., flowering was accelerated by about 6 days without any reduction in flower quality.

2883. Flint, H.
Snapdragon lighting.
Bull. N.Y. St. Flower Grs, 1958, No. 145, pp. 1, 3-5.

The effects of applying supplementary light to snapdragons at different times of the year and with different types of lamp are discussed. From results obtained so far a table is presented which shows times of sowing and types of lighting to get flowering from mid-December to mid-March, and the probable reduction in grade which will result. Lighting crops to flower later than March cannot be recommended. Lighting potted snapdragon plants is not recommended for longer than 30 days, and in bright weather 20 days is adequate. Lighting the plants every other night for 20 nights has given results similar to lighting every night for 10 nights.

2884. Mastalerz, J. W.
Boron deficient snapdragons noted in Pennsylvania ranges.
Flor. Exch., 1958, **130**(1): 12, 33.

Symptoms of B deficiency in snapdragons are described. Steam sterilization, the use of peat moss, liquid fertilizers and heavy applications of lime have contributed to the occurrence of B deficiency. Borax at 1 oz./100 sq. ft. is recommended for correction, and in well-drained soils several applications per year may be necessary.

2885. Teas, H. J., and Sheehan, T. J.
Chemical modification of geotropic bending in the snapdragon.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 391-8, bibl. 7, illus.

Snapdragon flowers packed for market show bending of the tips if held horizontally for comparatively short periods. This negative geotropic bending in response to gravity was found to begin with a lag of less than 30 minutes. Among several growth regulators tested only N-1-naphthylphthalamate inhibited this response, and its effect was partially overcome by GA and IAA. Naphthylphthalamate showed promise in a commercial test on flowers packed and despatched by air.—Fla agric. Exp. Stat., Gainesville.

2886. Rokitzka, A.
La microflora del suelo en la rhizosfera de *Matthiola incana*. (**The soil microflora in the rhizosphere of *Matthiola incana*.**) [English summary ½ p.]
Rev. agron. Noroeste argent., 1954, **1**: 157-66, bibl. 4, [received 1958].

Soil from the rhizosphere of stocks contained less bacteria and more fungi than soil outside the rhizosphere, but had a much higher population of *Bacillus mycoides* which improves soil structure. The pH was 6·8 within and 8·0 outside the rhizosphere.

2887. Wigdor, S., Stinson, R. F., and McCall, W. W.
Chloride toxicity of flowering stock and sweet peas.
Quart. Bull. Mich. agric. Exp. Stat., 1958, **40**: 468-76, bibl. 20, illus.

Sweet pea and flowering stock plants were grown in 2 soil types at 6 levels of chloride. No significant reductions in growth due to chloride applications were observed in either plant. In stock leaves interveinal necrosis was more prevalent at the 3 higher levels of chloride than at the 3 lower levels, and a foliar tip necrosis was also related to chloride levels. In some cases the lower leaves of sweet peas receiving higher levels of chloride showed similar interveinal necrosis. On one of the soil types, a sandy loam, branching of sweet peas was seriously depressed; the cause of this is unknown, but it may have been due to restricted drainage and aeration, or to too high a pH, or to a combination of these factors. On the same soil stock plants had reduced stem diameters, and this may have been caused by restricted aeration, which reduced water uptake and thus affected cell enlargement.

2888. Shao, L., and Lou, Č.
Conditions promoting the development of spring and summer flowers of *Viola patrinii*.
[Chinese, with English summary.]
Acta exp. Biol. sinica, 1956, **5**(1): 140-5, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,386.

Viola patrinii produces 2 types of flower: in the spring beautiful, large, zygomorphous and entomophilous flowers, and in the summer small, apetalous and cleistogamous flowers. In the Peking province in the autumn vigorous plants of *V. patrinii* produced a secondary crop of large flowers. Results of subsequent studies have shown that, irrespective of day length, at high temperature (25° C.) small summer flowers are produced and at a low temperature (15° C.) large spring flowers. Plants grown at temperatures fluctuating within a wide range can produce spring and summer flowers simultaneously.

2889. Lloyd, P. J., and Crossan, D. F.
Anthracnose of pansy and violet caused by *Colletotrichum violae-tricoloris*.
Plant Dis. Reptr, 1958, **42**: 86-90, bibl. 8.

Symptoms induced by anthracnose are described. Protectant sprays of maneb and zineb at 2 lb. per 100 gal. have given control. The viola variety Cornuta Chantreyland has shown marked resistance to infection.—Del. agric. Exp. Stat.

Bulbs, tubers, etc.

(*See also* 2551, 2648, 2944a, k-m, p, w, y, 2945a, c-f, i, l.)

2890. Sheehan, T. J., and Howe, K. J.
A study of some factors affecting amaryllis flowering.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 387-9, bibl. 3, illus.

Amaryllis bulbs were lifted on 5 dates between Oct. 19 and Jan. 14 and were stored at room temperature until Jan. 14, when all were potted for forcing. The time of lifting had little effect on forcing, the first batch lifted taking only 6 days longer to flower than the last batch. Delayed lifting did, however, result in taller flower spikes. All bulbs with a circumference over 23·75 cm. flowered when forced under glass.—Fla agric. Exp. Stat., Gainesville.

2891. Nakasone, H. Y., and Kamemoto, H.
Wood shavings as a medium for anthuriums.
Circ. Hawaii agric. Exp. Stat. **53**, 1957, pp. 11, bibl. 1, illus.

The effects were investigated of 6 different rooting media, 2 shade levels (67% and 75%), and 2 cultural methods (pot or ground culture) on anthurium flower production, spathe size and stem length. The 1 : 1 mixture of wood shavings and soil, a 5 : 1 mixture of wood shavings and cow manure, and tree fern fibre produced the best plant growth at both shade levels. More flowers were produced in 67% shade than in 75% shade. Spathe size was not affected by the amount of shade, but was completely dependent on media. Stem length was significantly longer in 75% shade. Flower production was not affected by the 2 methods of culture, but spathe size and stem length were better in the pot culture method.

2892. Maatsch, R.
Kühllagerung von Cyclamen-Jungpflanzen.
(Cold storage of cyclamen seedlings.)
Gartenwelt, 1958, **58**: 51-2, bibl. 1, illus.

The author found that cyclamen seedlings ready to be despatched could be stored for up to 5 weeks, if they were kept in plastic bags at 3° C. with their roots embedded in moist peat. One week's cold storage did not delay development as compared with untreated controls.—Inst. ZierpflBau, Hannover.

2893. (Boodley, J. W.)
Tests try cyclamen growing under mist.
Flor. Exch., 1958, **130**(10): 17.

Young cyclamen plants were given 3 treatments, namely full sunlight, 50% shade, and full sunlight with intermittent mist. No differences in time of flowering were observed but flowers under intermittent mist soon rotted. Plants grown in full sunlight without mist produced the greatest average fresh and dry weights. Fresh and dry weights of small and medium-sized misted cyclamen plants were much lower than those from any other treatment. It is suggested that the poor results with mist may have been due to dull weather during the trial.—Pa St. Univ.

2894. Faust, C. E.
The dahlias.
Nat. hort. Mag., 1958, **37**: 4-19, illus.

The terms used by the American Dahlia Society to classify dahlias by type and colour are described. Brief notes are also provided on culture and on a number of varieties found generally adaptable throughout the U.S.A.

2895. Kosugi, K.
Studies on blindness in gladiolus. IV. Effects of defoliation and low light intensity on flowering of gladiolus. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1957, **8**: 141-7, bibl. 16.

Flowering percentage was not affected by leaf removal or by reduced light intensity, or, in the case of a winter crop, by supplementary lighting. One of the varieties grown in winter, Picardy, failed to flower because the temperature was too low, but apart from this no blindness occurred. [For part III see *H.A.*, 27: 1729.]

2896. Magie, R. O.
Soil fumigation in controlling gladiolus *Stromatinia* disease.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 373-9, bibl. 5, illus.

In greenhouse experiments neither Crag Mylone nor Vapam were effective for *Stromatinia* control unless the soil surface was sealed. In field experiments Terraclor at 200 lb. per acre was phytotoxic. Corm production in 1955 was highest with Terraclor at 150 lb. per acre and with Crag Mylone at 200 lb. per acre. In 1956 weed control was fair with the highest rates tested of Crag Mylone and Vapam. Crag Mylone treatments (50 lb. or 100 lb. per acre) were superior to comparable dosages of Vapam for disease control, but both materials can be recommended for use by growers.—Gulf Coast Exp. Stat., Bradenton.

2897. Gelein, C.
Grape hyacinths. [Dutch.]
Vakbl. Bloemist., 1957, **12**: 454, from abstr. in *Informationsdienst. Weihenstephan*, 1958, No. 1, p. 4.

Studies at Lisse have shown that grape hyacinth bulbs for forcing should not be larger than size 8–9. Uncooled bulbs start to flower about the end of January and beginning of February. The boxes are buried to their rim and the bulbs covered with a soil layer 1 cm. in depth. An additional covering of straw or reeds may be given.

2898. Harrison, D. J.
A *Fusarium* rot of bulbous iris.
Plant Path., 1958, 7: 16-18, bibl. 2, illus.

Iris bulbs imported into Guernsey have frequently been infected with *Fusarium oxysporum*. Inoculation tests and symptoms are described. At present the only recommended control measures are careful selection of bulbs for planting and steam sterilization of glasshouse soil.—Guernsey hort. adv. Serv.

2899. Nelson, K. S., and Kiplinger, D. C.
Storage temperature affects flowering dates of Croft lilies.
Ohio Fm. Home Res., 1955, **40**: 99-100, illus., [received 1958].

To obtain the maximum number of flowers on stems 18 to 24 in. long, the bulbs should be stored at 32°–35° F. before potting. Higher storage temperatures caused later flowering and shorter stems.

2900. Kiplinger, D. C.
Easter lily height and flower buds affected by temperature and shade.
Ohio Fm Home Res., 1956, **41**: 77.

Croft lilies were forced, both in full sun and under shade, at 3 temperatures, viz. 50° F. from 19 Nov. to 1 Feb., then 60° F.; 60° F. continuously from 17 Dec.; and 60° F. from 17 Dec. to 1 Feb. then 70° F. Increased temperatures and shading both increased plant height above the desirable 30 in., decreased the average number of flowers per plant and greatly increased the percentage of blasted flowers per plant.

2901. Bald, J. G., and others.
Root rot of Easter lilies.
Calif. Agric., 1958, **12**(4): 3, 14.

A pre-planting fungicidal dip of ferbam plus PCNB has been used commercially for root rot control. Following treatment the plants were more vigorous and retained their green colour after flowering, the basal roots survived, and the harvested bulbs were white rather than yellow. When forced treated bulbs gave at least one flower more than did commercial stocks. Fumigation of old lily soil with methyl bromide also improved plant vigour.—Univ. Calif., Los Angeles, etc.

2902. Miller, V. L., Gould, C. J., and Polley, D.
Some chemical properties of phenylmercury acetate in relation to fungicidal performance.
Phytopathology, 1957, **47**: 722-6, bibl. 9.

In the usual procedure for treating narcissus bulbs for control of basal rot (*Fusarium oxysporum* f. *narcissi*), loss of PMA occurs from the treating solution. Compensation for this loss may be made by adding more PMA at regular intervals to the treating tank or by formulation with other chemicals to prevent loss from contact with iron, wood or soil. Tests showed that formulating PMA did not decrease its fungicidal efficiency, but the amount of phenylmercury deposited on the bulbs from unformulated PMA was much greater than from formulated. Phenylmercury acetate formulated with thiol acids at pH 10·5 appeared to be as effective against basal rot as did the unformulated solution, provided concentrations sufficiently high to leave an equivalent amount of PMA on the bulb were used. Flowers from treated bulbs showed no evidence of mercury injury even when 2,200 p.p.m. formulated PMA was used.—West. Wash. Exp. Stat., Puyallup.

2903. Luyten, I.
Goede en verlate bloei van *Nerine sarniensis* (L.) Herb. "Corusca major". **(Successful and delayed flowering of *Nerine sarniensis* "Corusca major".)** [English summary 1½ pp.]
Meded. LandbHogesch. Wageningen, 1957, **57**(8): 1-25, bibl. 13, illus.

Inflorescences in *Nerine* are formed 18 months before flowering in bulbs with a circumference of 12 cm. or more. Bulbs should be planted half buried in the soil in pots and should be grown at 15° C. with as much light as possible. Bulb size increases during April–

June, and high temperatures, which are followed by leaf withering, should be avoided at this time. After drying under straw the bulbs can be stored at 20 or 23° C. in dry sand. Bulbs in which the circumference shrinks to below 14 cm. may be given hot-water treatment at 43·5° C. for 2–2½ hours, and after potting their circumference gradually increases. Bulblets, which are used for multiplication, are best taken from stock bulbs after storage. Flowering may be retarded by storage at 27–29° C., but this high-temperature storage results in some decay and in reduced bulb circumference and flowering, and its use cannot be recommended for more than 1 year.—Lab. plantenphysiol. Onderz., Wageningen.

2904. Toyoda, T., and Nishii, K.
Studies on high temperature treatments of tulip bulbs to prevent flowering. (I) Effects of date and length of treatments on flowering growth and bulb production. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 243-50, bibl. 10, illus.

Heat treatment (35° C.) was given for varying periods, starting on different dates, to bulbs of 2 tulip varieties. The most successful treatment, giving 100% non-flowering plants, was 13 days at 35° C. starting from early October. The heat treatment should be continued for slightly longer if started before October. The number and weight of new bulbs was increased by heat treatment.

2905. Kirton Experimental Husbandry Farm.
Hot water treatment remains best for tulip eelworm.
Comm. Gr, 1958, No. 3254, pp. 1129-30, illus.

Hot-water treatment at 110° F. for 2½ hours is considered adequate to kill eelworm in tulip bulbs. To be successful and to avoid injuring the bulbs, however, it is important that they should be lifted when mature in the second half of June and treated about 14 days later. Hot-air treatment (1–6 weeks at 80–90° F., or 6 hours to 2 days at 100–110° F.) has not been successful, because the bulbs dry out. The best results in weed control have been obtained by pre-emergence applications of sodium arsenite followed by post-emergence applications of CIPC.

Lawns and sports turf.

(*See also* 2484-2488, 2945t.)

2906. Manner, R.
Några synpunkter på undersökningsmetodiken i fråga om gräsmattor. **(On methods of studying lawns.)** [English summary 11 lines.]
Meddel. Gullak. VäxtförädlAnst., Hammenhög, 1957, No. 14, pp. 29-33.

The number of grass shoots per square metre in lawns varied markedly with the species. Counts showed *Agrostis stolonifera* to have 4,000–10,000 shoots, *A. tenuis* 15,000–19,000, *A. canina* 45,000, *Cynosurus cristatus* 7,400, *Festuca rubra* 22,200, *F. ovina* 50,000, *Poa pratensis* 5,000–10,000, *P. palustris* 14,000–25,000 and *P. nemoralis* 20,000. Variations in the stand from year to year were also determined. The method of sampling, based in each case on 4 areas of 10 sq. cm. chosen at random, is discussed.

2907. Nicholas, A. W.
The re-seeding of damaged areas on bowling greens and cricket squares.
Park Administ., 1958, **22**: 553.

Holes 6 in. deep, ½ in. in diameter and 1 in. apart were made over damaged turf areas in summer and autumn and were filled with soil in which grass seed was sown. Two to three weeks after germination the worn areas were covered with grass.

2908. Al-Aish, M., and Brown, W. V.
Grass germination responses to isopropylphenyl carbamate and classification.
Amer. J. Bot., 1958, **45**: 16-23, bibl. 31.

The responses of grasses to isopropyl-N-phenyl carbamate (IPC) vary among genera, tribes, and subfamilies, but the different responses are correlated with other systematic characters. With no exceptions, treated seed of species classified in the subfamily Festucoideae are completely inhibited from germinating. On the other hand, no species in the subfamily Panicoideae is seriously inhibited by treatment; in fact, seed of most species germinate more quickly and in greater numbers than do the controls. Responses vary among genera of the group Phragmitiformes, indicating that this is probably an artificial aggregation. A satisfactory treatment for differentiating between the Festucoideae and the Panicoideae consists in treating dry seed for 24 hr. in a 0·05% solution followed by washing in water and further germination in Petri dishes on filter paper moistened with water. [From authors' summary.]—Univ. Texas, Austin.

2909. Weihing, J. L., Jensen, S. G., and Hamilton, R. I.
***Helminthosporium sativum*, a destructive pathogen of bluegrass.**
Phytopathology, 1957, **47**: 744-6, bibl. 5.

Helminthosporium sativum was found to be the principal disease organism affecting bluegrass turfs in eastern Nebraska in 1956. The symptoms of the disease were found to vary greatly with temperature and moisture. Results from greenhouse studies and the findings from surveys of diseased lawns suggest that control might be gained through fungicidal sprays [of captan, dichlone and zineb] and employment of those cultural operations that permit the greatest amount of drying of the foliage without being harmful to the maintenance of a fine turf. [From authors' summary.]—Univ. Neb., Lincoln.

2910. Polivka, J. B.
Present status of insecticides for control of grubs in turf.
Ohio Fm Home Res., 1957, **42**: 47, 55.

Of several insecticides under test for the control of Japanese beetle, northern masked chafer and June beetle grubs, chlordane at 5 lb./acre has proved outstanding, being apparently still fully effective 11 years after application. Newer compounds which show promise include dieldrin, aldrin, heptachlor and endrin.

Orchids.

(*See also* 2944e, 2945j.)

911. Schutt, K.
Vereinfachte Anzucht von Orchideen aus Samen. II. Desinfektion der Samen und Aussaat. **(A simplified method of raising orchids from seed. II. Seed disinfection and sowing.)** [English, French and Spanish summaries 5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1958, **8**: 33-40, bibl. 7.

The separation of sterile seeds, disinfection and sowing of orchid seeds is described. In disinfection experiments seeds of *Cattleya*, *Cymbidium* and *Odontoglossum* nfected with *Aspergillus niger* were dipped in 11 ungicides before sowing. Satisfactory control was obtained with solutions of calcium hypochlorite (5 g. chloride of lime in 100 ml. water), sodium hypochlorite 10 ml. sodium bleach liquor in 100 ml. water) and 2% ormalin. [For Part I see *H.A.*, 27: 1745.]

912. Dycus, A. M., and Knudson, L.
The role of the velamen of the aerial roots of orchids.
Bot. Gaz., 1957, **119**: 78-87, bibl. 9, illus.

Studies on 8 genera of orchids show that only when the aerial roots enter the solid substratum will the velamen be sufficiently modified to absorb water and nutrients and pass them to the cortex and stele. Otherwise, apart from mechanical injury, the velamen and exodermis are permeable only to gases and the aerial root is a liability rather than an asset to the plant.—Oberlin Coll., Ohio, and Cornell Univ., Ithaca, N.Y.

913. Murakishi, H. H.
Host range, symptomatology, physical properties, and cross-protection studies of orchid virus isolates.
Phytopathology, 1958, **48**: 132-7, bibl. 14, illus.

Cattleya colour-break virus proved to be the most stable of the isolates. It was not inactivated *in vitro* at 80° C. for 10 min., or when stored at room temperature (20–30° C.) for 32 days. Vanda mosaic virus was less stable than the other isolates and was inactivated at 60° C. and after ageing for 5 days.—Univ. Hawaii, Honolulu.

Succulents.

(*See also* 2078, 2944v, 2945g, 3182.)

2914. Busch, G., and Resende, F.
Dominanz-Wechsel während der Entwicklung der Blüte (*Aloë*) III. Beitrag zu dem chromatographischen Studium der betreffenden Pigmente. **(Change of dominance during *Aloe* flower development. III. Contribution to the chromatographic study of the pigments concerned.)** [English summary 1½ pp.]
Portugal. Acta biol., Sér. A, 1957, **5**: 45-74, bibl. 23, illus.

Pigment inheritance was studied in flowers of *Aloe* hybrids, in which a yellow flower developed from a red bud. Flowers opening in winter, however, did not complete the colour change, but turned pink. The chief pigments were the carotenoids lycopin and xanthophyll. In other *Aloe* species developing yellow flowers from red buds the change was not one of dominance, and the pigment complex was differently constituted.

2915. Bünsow, R., and Harder, R.
Blütenbildung von *Bryophyllum* durch Gibberellin. **(Flower formation induced in *Bryophyllum* by gibberellin.)**
Naturwissenschaften, 1956, **43**: 479-80, bibl. 5, illus., [received 1958].

Plants of *Bryophyllum crenatum* grown for 4 years under short-day lighting were treated daily for 14 days with a drop of 50 mg./l. gibberellin solution applied to the growing points, beginning in July. Elongation resulted and flower buds were visible 28 days after treatment began and opened normally during August. Control plants remained short and vegetative. In *B. daigremontianum* the response was similar, but somewhat slower.—Pflanzenphysiol. Inst. Univ. Göttingen.

2916. Harder, R., and Bünsow, R.
Über die Wirkung von Gibberellin auf Entwickling und Blütenbildung der Kurztagpflanze *Kalanchoë blossfeldiana*. **(On the effect of gibberellin on the development and flower formation of the short-day plant *Kalanchoe blossfeldiana*.**
Planta, 1958, **51**: 201-22, bibl. 31, illus.

(1) Gibberellin [in various concentrations and amounts] was injected into the leaves of photoperiodically induced *Kalanchoë* plants or applied to the terminal bud. (2) Gibberellin produced these among other effects: a marked elongation of the main shoots and a growth stimulation of the lateral shoots, an increase in the size of the leaf area (length increased more than width), and a reduction in the succulence of the leaves; the petals also became longer and narrower; and hyponasty in both foliage leaves and petals was pronounced. (3) Exposure to long- or short-day treatment did not fundamentally affect the characteristic responses produced by gibberellin. (4) Under long-day conditions it was not possible to induce flowering in *Kalanchoë* with the aid of gibberellin. (5) With plants growing under long-day conditions, which had received a flowering impulse by exposure to short days, gibberellin checked flowering; both the number of flowering plants and the number of flowers per plant were reduced, the leafiness of the bracts was increased, and the inflorescences tended to become longer, and showed a strong tendency to continue vegetative growth. (6) By and large, the effect of gibberellin on the growth habit of *Kalanchoë* was similar to that of long-day treatment. With short-day plants, the growth habit approached that of long-day plants and with long-day plants the long-day characteristics were accentuated. (7) When two leaves are left on a plant, one above the other, and these are exposed to opposite conditions of day-length the inhibition of flowering will proceed from the long-day leaf only if it is the upper one; but the inhibition of flowering induced by gibberellin asserted itself also in the case of a lower leaf; thus, the overall effect of gibberellin greatly exceeds that of a simple long-day inhibition. [From authors' summary.

A preliminary account of some of this work appeared in *Naturwissenschaften*, 1956, **43**: 544.]—Pflanzenphysiol. Inst. Univ. Göttingen.

2917. Bünsow, R., and von Bredow, K.
Wirkung von Licht und Gibberellin auf die Samenkeimung der Kurztagpflanze *Kalanchoë blossfeldiana*. **(The action of light and gibberellin on the seed germination of the short-day plant *Kalanchoë blossfeldiana*.**
Biol. Zbl., 1958, **77**: 132-41, bibl. 24.

(1) The germination capacity of the seeds of *Kalanchoë blossfeldiana* is low directly after the harvest; it increases during the first 4 months and then remains approximately constant during the following 10 months. (2) Germination takes place only in the light. At 25° C. and within a range of 180–4,400 Lux it proceeds independently of light intensity. (3) The decisive factor is the duration of the daily photoperiod. Germination only begins above a critical day length, and with extending photoperiods its rate rises to a maximum value which is retained under conditions of permanent light. (4) Of equal importance is the number of light periods each day; as these are increased there is a steep rise in the germination percentage. (5) If part of the daily photoperiod is inserted in the dark period germination is not affected or only slightly stimulated. Stimulation occurs only when the photoperiod is inserted approximately in the middle of the dark period. (6) If, however, the daily photoperiod is split up into more than two periods, germination is enhanced considerably. (7) Gibberellin (1–100 mg./l.) does not enhance germination in the dark, but it improves the germination capacity, thereby reducing the critical day length and raising the germination percentage in the light. Gibberellin and light are therefore additive. (8) The seed germination of the short-day plant *Kalanchoë blossfeldiana* follows the laws that are valid for the flower formation of long-day plants. The differences between the effects of photoperiod on seed germination and on flower formation are discussed. [From authors' summary.]—Pflanzenphysiol. Inst., Univ. Göttingen.

Roses.

(*See also* 2944o.)

2918. National Rose Society of Great Britain.
The rose annual, 1958.
National Rose Society, London, 1958, 8×5 in., pp. 166, illus., 8s. 6d.

As in the past this handsomely illustrated Annual contains a large number of interesting articles. Among these are several accounts, both from the U.S.A. and England, of experience in the application of foliar nutrients to roses; the results obtained appear generally to have been favourable, and attempts are now being made to produce additional responses by including antibiotics and gibberellins in the nutrient spray. More conventional forms of nutrition *via* the soil are represented by discussions on the use of composts and gypsum in rose gardens. Useful advice is provided on the choice of insecticides and fungicides for roses. Rose chromosomes are discussed in some detail, and, as usual, there are several articles on rose varieties, including one on the progeny of "Peace", which still occupies first place among the "varieties producing large specimen blooms" listed in the yearly "analysis" of rose varieties. Finally, as an indication of the constantly expanding interest shown in roses, it may be mentioned that the membership of the Society showed a net gain of about 6,000 in 1957 to bring the total membership to 56,000.

2919. Kuppuswamy, K. P., and Sampath, V.
Description of rose varieties at Sim's Park, Coonoor, with key for identification of most popular varieties.
South Indian Hort., 1956, **4**: 105-17; 1957, **5**: 67-71, 111-21 and 140-52.

In addition to the key, separate descriptions are given of 77 rose varieties in the Sim's Park collection. The characters described in most detail are vegetative, the main object being to assist people in the Nilgiris and elsewhere in South India to identify their varieties when out of bloom.

2920. Kiplinger, D. C., and Nelson, K. S.
Golden Rapture roses show color changes if night temperature varies.
Ohio Fm Home Res., 1957, **42**: 70.

The desirable deep golden colour in Golden Rapture roses was achieved by maintaining the greenhouse night temperature at 65° F. or at 60° F. rising to 65° F. when the buds were formed. Lower temperatures increased the percentage of pale off-coloured flowers.

2921. Shisa, M., and Hazu, G.
Studies on the use of synthetic soil conditioners in horticulture. (IV). Their application to media for rose cuttings, and the relation between soil structure of the medium and rooting response of the cuttings. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 251-60, bibl. 39, illus.

Cuttings of *Rosa multiflora* were rooted in 4 different media. Rooting in sand, vermiculite and a heavy clay soil was slow, and the roots were thick, unbranched and brittle. In a medium consisting of compost plus conditioner (VAMA or HPAN) cuttings rooted rapidly, producing fine, branched roots. There was less check to growth at transplanting among cuttings from the conditioned compost than among those from vermiculite or sand. In vermiculite and heavy soil rooting percentages and branching were increased by irrigation. Water-stable aggregates obtained from the use of conditioner were separated and rooting in each fraction was compared. The highest rooting and the best root system were obtained with 0·22–1 mm. aggregate. In general, media in which air spaces amounted to about 10% or more were suitable for rooting cuttings.

2922. Lyle, E. W.
Progress in rose black spot control.
Amer. Nurserym., 1958, **107**(8): 11, 82-4.

Several of the newer fungicides were tested against black spot of roses, applications being made at weekly intervals from 12 June to 25 September at about 120 gal. per acre. Manzate-containing sprays and Phaltan gave the best control of black spot. Phaltan resulted in the heaviest bushes at the end of the season. Best retention of foliage was obtained with Manzate-containing sprays, followed in descending order of effectiveness by Phaltan spray, captan spray, sulphur-copper dust and maneb-Marlate dust. Plots in which the foliage was retained longest had the best root systems and the greatest accumulation of starch in the canes. Little or no damage occurred to the foliage from any of the fungicides tested. In another experiment 2 or 3 sprays of Acti-dione PM a week apart quickly stopped rose mildew and gave good control of black spot, but the spray had a short residual action. Manzate at 0·75 lb. in 50 gal. was more effective at an application rate of 240 gal. per acre than at 120 gal. per acre. Spraying at weekly intervals is recommended.—Texas Rose Res. Found. Inc., Tyler, Tex.

2923. Stessel, G. J.
Botrytis control in stored rose stocks.
Plant Dis. Reptr, 1958, **42**: 396-8, bibl. 2.

Fungicides were tested for control of *Botrytis* sp. in the laboratory and on dormant rose bushes in cold storage. Bare-rooted rose bushes were treated with 11 fungicides, applied either as aqueous dips, dusts or in the vapour phase, and stored in sealed plastic bags for 3 months. On the basis both of control of *Botrytis* development following treatment and of the subsequent season's growth and flowering, effective chemicals were: Captan (7·5% dust), Vancide 51 (4,800 p.p.m. dip), Kromad (4,800 p.p.m. dip), and Mycostatin (500 p.p.m. dip). [From author's summary.]—R.I. agric. Exp. Stat., Kingston.

2924. Sher, S. A.
A disease of roses caused by a root-lesion nematode, *Pratylenchus vulnus*.
Phytopathology, 1957, **47**: 703-6, bibl. 11, illus.

A disease of roses has been demonstrated to be caused by a root-lesion nematode *Pratylenchus vulnus*. Root-lesion nematode disease is characterized by stunted chlorotic plants with necrotic root systems that are smaller than normal. *Trichodorus christiei* from rose fields did not produce this disease. Leaves from plants infested with *P. vulnus* were lower in iron, copper and potassium than were control plant leaves. [From author's summary. See also *H.A.*, 27: 2748.]—Univ. Calif., Riverside.

2925. Gorjainov, M. N.
The role of fermentation in increasing the essential oil yield of rose petals. [Russian.]
Krat. Otčet o n.-i. Rab. Vses. n.-i. In-ta masl. i efiromasl. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 106-11, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,364.

Analyses of the petals of the red Crimean rose (*Rosa gallica*) have shown that the essential oil occurs in both free and bound forms. To increase the yield of oil the glucoside complex, in which the bound form occurs, must be destroyed. This is achieved by acid hydrolysis or preliminary fermentation of the petals. Fermentation in ultraviolet light for 10 min. increased oil yields by 32–72% while fermentation for 1–2 hrs at 50° C. increased yields by 80–100%.

2926. Grigorovič, N. D.
Vitamin C in the fruits of Crimean roses. [Russian.]
Krat. Otčet o n.-i. Rab. Vses. n.-i. In-ta masl. i. efiromasl. Kul'tur VASHNIL za 1955, Krasnodar, 1956, pp. 112-15, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,372.

The hips of white, red and pink roses collected from August to December were compared with wild rose hips. Vitamin C contents were higher in the hips of white roses than those of red and pink roses. Maximum vitamin C contents occurred in white rose hips harvested when fully mature on October 14–17, and in red and wild rose hips harvested on November 13. White rose hips harvested on November 13 showed reduced vitamin C contents but these were not further depressed by storage.

Other trees and shrubs.

(*See also* 2082, 2118, 2944g-j, t, x, 2945b, o-s, 3026k.)

2927. Davidson, H., and Hamner, C. L.
Photoperiodic responses of selected woody ornamental shrubs.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 327-43, bibl. 17, illus.

Hibiscus syriacus, *Weigela florida* and *Rhododendron catawbiense* made maximum growth under long days and minimum growth under short days. *Weigela florida* was kept growing continuously under long days (16 hours or greater). Dormancy was induced in vegetative plants of weigela within 3 weeks when transferred from long to short days. *Rhododendron catawbiense* grown under long days (16 hours or greater) made four flushes of growth, compared to one flush of growth for plants under a short or natural photoperiod. *Hibiscus syriacus* and *Rhododendron catawbiense* produced significantly more flower buds when grown under long days. Rhododendron, however, showed a malformation of the flower buds when grown under photoperiods of 16 hours or longer. Short days inhibited the growth of *Taxus cuspidata*. *Buddleja davidi* and *Philadelphus coronarius aureus* showed no responses to variation in the photoperiod. Shrubs that were shown to be photoperiodic-sensitive exhibited a perfect relationship between degree of winter injury and the day length under which they had been grown prior to the onset of winter. Plants previously grown under long days exhibited considerable injury, whereas plants previously grown under short days exhibited only slight injury. [From authors' summary.]

2928. Waxman, S.
The development of woody plants as affected by photoperiodic treatment.
Diss. Abstr., 1957, **17**: 2372, being *Publ.* 23,150 of 201 pp.

The effects of various photoperiodic treatments on the growth and development of some ornamental trees and shrubs are reported. Short days tended to decrease the rate of growth in *Thuja*, *Juniperus* and *Abelia*, and stopped growth completely in *Cornus*, *Weigela* and *Viburnum opulus*. Long days tended to increase growth rates or to prolong the growth period. The development of autumn colour was delayed by long days. Dormant plants in leaf were forced into renewed growth by long photoperiods. The short day effect was nullified by a brief interruption of the dark period. Flowering of *Weigela florida* and *Abelia grandiflora* was hastened by long days and delayed by short days. *Abelia* flowering was promoted by a red-light interruption of the dark period, but inhibited by a far-red light interruption. Long photoperiods increased the rooting of cuttings of some woody plants. Short photoperiods hastened seed germination of *Sciadopitys verticillata*. The main locus of perception of the photoperiodic stimulus in woody plants was found to be the newest fully-expanded leaves. Chromatographed extracts of *Cornus florida rubra* grown under short days contained mostly growth-inhibitory substances, whereas in extracts of plants grown under long days growth-stimulators predominated. —Cornell Univ.

2929. SCHUDER, D.
Tree borers and effective control measures.
Comb. Proc. 33rd nat. Shade Tree Conf. 1957, pp. 98-104, bibl. 5.

Twenty-nine treatments were tested for borer control on maple, birch and crab-apple trees. The treatments included wraps, paints and insecticides, and all gave protection except shade boards. Of the wrappings aluminium foil gave the best results; some of the others had an adverse effect on tree growth. The application of a persistent insecticide to the trunk and lower branches in late May or early June is also recommended. [See also *H.A.*, 27: 2750.]—Purdue Univ., Lafayette, Indiana.

2930. AROEIRA, J. S.
Viabilidade e longevidade dos grãos de pólen de *Camellia sasanqua*, Thunb. (**Viability and longevity of pollen grains of *Camellia sasanqua*.**) [English summary 1 p.]
Rev. Ceres, 1957, **10**: 164-75, bibl. 75, bibl. 9.

The best time for collecting viable pollen from flowers of *Camellia sasanqua* was within 24 hours of anthesis. Pollen in detached flowers, kept at laboratory or out-of-door temperatures but protected against loss of moisture, remained viable for 48 hours.

2931. KUITERT, L. C.
Thimet plus oil emulsion controls tea scale.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 370-2, bibl. 4.

A single application of Thimet plus oil emulsion in early May was highly effective against immature tea scale insects (*Fiorinia theae*) on camellias. It also gave good control of citrus whitefly (*Dialeurodes citri*) on gardenias.—Fla agric. Exp. Stat., Gainesville.

2932. DE BOER, S.
Ziekten bij clematis en rododendron veroorzaakt door schimmels uit de bodem. (**Soil-borne fungus diseases of clematis and rhododendron.**)
Tijdschr. PlZiekt., 1958, **64**: 120-1.

Soil treatment with TMTD and zineb has shown some reduction in infection of clematis by *Phytophthora* spp. Present recommendations for *Phytophthora* control on clematis and rhododendrons are the destruction of infected plants and soil sterilization with formalin.

2933. ENRIGHT, L. J.
Propagating dogwood by cuttings.
Amer. Nurserym., 1958, **107**(6): 11, 95-6, illus.

Cuttings of *Cornus florida* were taken at 4-week intervals throughout the year from 15-year-old trees. The cuttings were 6 in. long, made with a straight basal cut below a node, and a thin strip of wood was removed from each side of the base. They were dipped in IBA at 5,000, 10,000 or 20,000 p.p.m., and inserted in sand in a greenhouse bench under intermittent mist. It was found possible to root cuttings from March to September, the period for rooting varying from 39 to 67 days. Rooting was 100% in cuttings taken in April–July and given 20,000 p.p.m. IBA. The number and length of roots decreased as the concentration of IBA was reduced, only 0–2% of the controls without hormone treatment rooting. Similar results were obtained with *C. f. rubra* taken in April–June.—Dep. Hort., Univ. Md, College Park.

2934. DICKEY, R. D.
Effect of propagation media and dip treatments on rooting of flowering dogwood, Formosa azalea and East Palatka holly.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 385-7, bibl. 11.

Half-ripened cuttings of *Cornus florida*, *Ilex opaca* var. East Palatka and *Rhododendron indicum* var. Formosa were rooted in four media, namely 20%peat+80% shavings, 40% peat+60%shavings, 60% Perlite No. 8 +40% peat, and 60%Perlite No. 8+40% Perlite No. 30. Cuttings were soaked for 24 hours in sucrose solution, which was combined with a hormone powder (NAA) dip in some cases, before insertion in the rooting medium. Formosa azalea rooted equally well in all media regardless of dip treatment. Rooting of flowering dogwood without dip was lowest in the mixture of 2 grades of perlite, but sucrose treatment improved rooting in this medium. American holly responded to the sucrose-hormone dip in all media except the perlite/peat mixture; it is suggested that the hormone was responsible for the increase in rooting.—Fla agric. Exp. Stat., Gainesville.

2935. GARDNER, I. C.
Nitrogen fixation in *Elaeagnus* root nodules.
Nature, 1958, **181**: 717-18, bibl. 8, illus.

Seedlings of *Elaeagnus angustifolia* grew satisfactorily in water culture without N, when their roots became nodulated following the application of inoculum from *Hippophaë* nodules. Control plants without nodules made very feeble growth when N was omitted from the culture solution. In the treated plants the nodules contained 3·5% N, on a dry weight basis, compared with 1·8% in both roots and shoots. It is concluded that *Elaeagnus* must be added to the growing list of non-leguminous plants possessing nodules that are able to fix N.—Dep. Bot., Univ. Glasgow.

2936. PAPP, J.
Über die Unterscheidung der männlichen und weiblichen Exemplare des Ginkgobaumes im jungen Alter. (**On the differentiation between male and female plants of *Ginkgo biloba* at an early age.**)
Dtsch. Baumsch., 1958, **10**: 134-7, bibl. 2.

With male plants bud burst and leaf drop are about a fortnight earlier than with female trees. Similar differences were observed in other dioecious species.

2937. Frierson, J. L.
Burford holly shows value as understock.
Amer. Nurserym., 1958, **107**(9): 9, 56, illus.

Results of grafting experiments indicated that *Ilex cornuta burfordi* makes an excellent rootstock for many varieties of *I. aquifolium*, *I. cassine*, *Il cumulicola*, *I. opaca* and *I. topeli*. The rootstock was reasonably satisfactory for scions of *I. latifolia* and *I. pedunculosa* but unsatisfactory for *I. chinensis*, *I. integra* and *I. pubescens*. Graft compatibility and the growth rate of scion on rootstock seemed to be associated with the taxonomic relationships of the species. There is some evidence for suggesting that chromosome size may be related to incompatibility as well as to growth rates of compatible interspecific grafts.—Univ. S. Carolina, Columbia.

2938. Robbins, W. J.
Gibberellic acid and the reversal of adult *Hedera* to a juvenile state.
Amer. J. Bot., 1957, **44**: 743-6, bibl. 7, illus.

Five-year-old arborescent plants of variegated ivy *Hedera canariensis variegata*) received 13 atomized applications, each of 10 μg., of gibberellic acid in ml. of water, the first in October 1956, the next 3 in December and the rest weekly from January to March 1957. Within 4 weeks of the first application growth in length was greater than in control plants. After a further 6 weeks some of the new growth had produced aerial roots and 14 weeks from the first treatment a branch had developed juvenile leaves. By May 1957 the average branch length on control plants was 4 cm. and that on treated plants 31 cm., the longer branches bearing some abortive leaves and swollen axillary buds. Of the 6 plants treated, 2 produced no juvenile growth, 2 produced a single very long branch with a completely juvenile apical portion, one produced a single juvenile leaf and the sixth produced aerial roots. Of the 4 control plants, 2 produced negligible amounts of juvenile growth.—N.Y. bot. Gdn and Columbia Univ.

2939. Komarov, I. A.
Factors influencing the rooting of soft wood cuttings of lilac varieties. [Russian.]
Bjul. Gl. botan. Sada AN SSSR, 1956, No. 26, pp. 38-44, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,906.

Rooting was shown to be affected by the following 2 factors: geographical location of the mother plant, age of the mother plant, time interval between cutting and planting, number of internodes on the cutting, position of the cutting on the shoot, wounding the base of the cutting, conditions of storage for the cutting, depth of rooting medium over the nutrient soil mixture, depth of planting the cuttings, density of planting, number of water applications and methods of shading the propagator frames.

2940. Asen, S.
Anthocyanins in bracts of *Euphorbia pulcherrima* as revealed by paper chromatographic and spectrophotometric methods.
Plant Physiol., 1958, **33**: 14-16, bibl. 6.

The anthocyanins in the bracts from poinsettia plants of diploid Ruth Ecke (standard red), a seedling of tetraploid Ruth Ecke (dark red), and a cross between Ruth Ecke and Ecke's White (scarlet red) were isolated and identified by paper chromatographic and spectrophotometric methods. Acid hydrolysis of the anthocyanins and identification of the anthocyanidin and sugar moieties indicated that the anthocyanins in the bracts from all poinsettia plants examined were identical. They were cyanidin-3-glucoside (chrysanthemin), cyanidin-3-rhamnoglucoside (antirrhinin), pelargonidin-3-glucoside (callistephin), and pelardonidin-3-rhamnoglucoside. [Author's summary.]—U.S.D.A., Beltsville, Md.

2941. Rhododendron-Gesellschaft, Bremen.
Rhododendron und immergrüne Laubgehölze. Jahrbuch 1957. **(Rhododendrons and evergreen woody plants. Yearbook 1957.)**
Rhododendron-Gesellschaft, Bremen, 1957, pp. 92, bibls, illus.

The yearbook includes articles on rhododendron growing in Bremen, Holland, Norway, Scotland and the Alps, and on winter damage to, and the hardiness of, rhododendrons. There is also a short survey of important *Ilex* species, and a further communication on striking cuttings of shy-rooting rhododendron hybrids [see next abstract].

2942. Berg, J., and others.
Stecklingsbewurzelung bei schwer bewurzelbaren Rhododendron-Hybriden. 2. Mitteilung. **(The rooting of cuttings from shy-rooting rhododendron hybrids. 2nd communication.)**
Rhododendron immergr. Laubg. Jahrb. 1957, pp. 66-78, bibl. 1, illus.

Cuttings of V. H. Rutgers, E. S. Rand, Pink Pearl and Humboldt readily produced adventitious roots when a mixture of 100 mg. IBA+37·5 mg. arginine+0·5 mg. vitamin B_1 in 10 g. lanolin paste was applied to both sides of the basal cut. Rooting was better in a propagating frame heated by hot water than in one heated by electricity, possibly because the rooting medium was damper. Rooting of cuttings of Gomer Waterer and Hugo de Vries, which normally root easily, was not improved and was sometimes inhibited by application of the hormone preparation. [For part 1 see *H.A.*, 26: 4024.]

2943. Kiplinger, D. C., Dorer, R., and Nelson, K. S.
Lighting has greatest effect to reduce leaf-drop of greenhouse azaleas.
Ohio Fm Home Res., 1957, **42**: 54.

Five hours artificial lighting after sunset, from mid-July until October 1, greatly reduced subsequent leaf-fall in azaleas. In view of cost, however, it is considered better to illuminate the plants while they are being kept in refrigerated storage from October onwards, preparatory to forcing.

Noted.

2944.
a Abbiss, H. W.
Mechanised bulb production.
Comm. Gr, 1958, No. 3244, pp. 519-25, illus.
Equipment for hot-water treatment, temperature-controlled storage, planting, spraying, harvesting and grading.

b ALFIERI, B.
Experiments in modified ring culture for zinnias.
Gdnrs' Chron., 1958, **143**: 163, illus.
A bottomless wooden box standing on a bed of aggregate was used.

c BALI, P. N., AND TANDON, S. L.
Morphological and cytological studies of the diploid and the colchicine-induced autotetraploid in *Iberis amara* L. [Spanish summary ½ p.]
Phyton, 1957, **9**: 107-16, bibl. 24, illus.
Large-flowered tetraploids considered horticulturally promising [see also *H.A.*, 28: 1691].

d (BOODLEY, J. W.)
Plastic bags can be used in germination.
Ore. ornam. Nursery Dig., Feb. 1957, reprinted in *Flor. Exch.*, 1958, **130**(1): 12.
Bags enclosing seed boxes sown with snapdragon, aster and dahlia seeds.

e BURNETT, H. C.
Orchid diseases.
Proc. Fla St. hort. Soc., *1957*, 1958, **70**: 380-5, illus.
Including control measures.

f CAPREAL, S. H.
Outdoor chrysanthemum culture.
Gdn. J. N.Y. bot. Gdn, 1957, **7**: 153-5, 170-1, 184-6, 192, 196-7; 1958, **8**: 22-4, 29, 51, 59, 69, 125-6, 134, illus.
Soil requirements, cultural practices and disease and pest control.

g CARRA, P., THÉAU, A., AND BENAZOUZ, O.
Arboriculture d'ornement. **(Ornamental trees and shrubs.)**
Rev. hort. Algér., 1957, **61**: 184-99, 207-18, 232-9, 262-71, and 1958, **62**: 292-302, illus.
Completion of the series noted in *H.A.*, 27: 3815j and 28: 753j.

h COGGESHALL, R.
Asiatic maples, their propagation from softwood cuttings.
Arnoldia, 1957, **17**: 45-56, illus.
For another account see *H.A.*, 27: 2754.

i CONDIT, I. J.
Characters useful in the identification of species of *Ficus*.
Lasca Leaves, 1957, **7**: 81-6, illus.

j CORNELL, R. D.
Trees and shrubs for planting tomorrow's highways.
Lasca Leaves, 1957, **7**: 74-9, illus.
In California.

k EL-GAMASSY, A. M.
Retaining the rest-period of gladiolus corms by foliar sprays.
Ann. agric. Sci., Cairo, 1957, **1**(1): 243-59, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,488.
Using MH, the methyl ester or sodium salt of NAA, and the sodium salt of 2,4,5-T.

l GAARDER, P.
Dahlia. Sortskritikk fra sommeren 1957. **(Dahlia variety trials 1957.)**
Gartneryrket, 1958, **48**: 181-2.
Varieties tested at the Norwegian College of Agriculture.

m GHITANY, M. Y.
Studies of the uptake of some elements under controlled substrate and aerial temperatures in gladiolus.
Alexandria J. agric. Res., 1957, **5**(1): 37-48, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 100,948.
The effect of soil and air temperatures on uptake of N, P, Mg, Ca and K.

n GOWDA, M. H. M.
Lalbagh Botanical Gardens, Centenary Souvenir, 1957, pp. 128, illus.
A history of the gardens and a description of the collection.

o GUPTA, S. R., PANKAJAMANI, K. S., AND SESHADRI, T. R.
Survey of anthoxanthins: Part X.—A note on the anthoxanthins of red and yellow roses.
J. sci. industr. Res., India, 1957, **16B**: 154-6, bibl. 4.

p HANNIBAL, L. S.
The hybrids of *Amaryllis belladonna* and allies.
Saier's Gdn Mag., Spring 1954, reprinted as *News Lett. Bulb Soc. Calif.*, 1954, p. 1.
Notes on hybrids between *Amaryllis*, *Brunsvigia*, *Crinum* and *Nerine* spp. [see also *H.A.*, 26: 2053 l].

q HANSEN, R., AND FRANKE-LAUER, E.
Die Sichtung des Aubrieta-Sortimentes. **(A survey of aubrietia varieties.)**
Dtsch. Baumsch., 1958, **10**: 106-14, illus.

r HARTMANN, G.
Kurz- und Langtagsbehandlung bei *Chrysanthemum indicum*. **(Short- and long-day treatment of *Chrysanthemum indicum*.**
Gartenwelt, 1958, **58**: 58-60, illus.
Responses to photoperiodic treatment on a commercial scale.

s HESS, D.
Die Regulatoren des Streckungswachstums bei *Streptocarpus wendlandii* Utrecht und ihre Veränderungen während der Blühinduktion. **(The regulators of elongation in *Streptocarpus wendlandii* and their transformation during flower induction.)**
Planta, 1958, **50**: 504-25, bibl. 42, illus.
Two growth substances and one inhibitor extracted from leaves.

t HICKS, H.
The propagation of tree peonies.
Amer. Nurserym., 1957, **106**(8): 15-16, illus.
Nurse grafting onto herbaceous peony roots described.

u Imle, E. P.
Cochliostoma jacobianum.
Nat. hort. Mag., 1958, **37**: 43-6, illus.
Description of a rare, handsome epiphyte (fam. Commelinaceae).

v James, W. O.
Succulent plants.
Endeavour, 1958, **17**: 90-5, illus.
The occurrence and physiology of succulence.

w Kling, E. G.
The biochemistry of montbretia. [Russian.]
Reprinted from *Bjul. Gl. botan. Sada, AN S.S.S.R.*, 1955, No. 22, pp. 99-101, bibl. 5.
Saponins found in corms.

x Kosar, W. F.
A miniature holly for modern landscape: *Ilex cornuta* "Dwarf Burford".
Nat. hort. Mag., 1958, **37**: 110-11, illus.

y Lenski, I.
Über die Brutzwiebelbildung auf den Blättern von *Drimiopsis kirkii Bak.* **(On the formation of bulbils on the leaves of *Drimiopsis kirkii.***
Planta, 1958, **50**: 579-621, bibl. numerous, illus.
Regeneration of leaf cuttings also studied.

z Lowndes, D.
Progress report on mist propagation.
Gdnrs' Chron., 1958, **143**: 151, 160, bibl. 1, illus.
Tabulated results for cuttings of 68 ornamental species.

45.

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La coltivazione industriale degli anemoni. **(Commercial cultivation of anemones.)**
Pubbl. Staz. sper. Floric, Orazio Raimondo, Sanremo, **73**, 1955, pp. 12, bibl. 3, [received 1958].

b Oliver, R. W.
Ornamental shrubs for Canadian gardens.
Publ. Canada Dep. Agric. **1011**, 1957, pp. 32, illus.
Suitable species with notes on propagation and cultural instructions.

c Pape, H.
Krankheiten und Schädigungen der Tulpen. **(Tulip diseases and disorders.)**
FlugBl. biol. Bundesanst. Braunschweig **80**, 1958, pp. 8, illus.
Symptoms and control.

d Pfeiffer, N. E.
***Lilium* Pfeiffer hybrids.**
Nat. hort. Mag., 1958, **37**: 65-6, illus.
Lilium auratum × L. japonicum.

e Pucci, E.
Le anguillulosi. **(Nematode infestations.)**
Inf. fitopat., 1958, **8**: 50-7, 71-7, illus.
Of narcissi, chrysanthemums, primulas, strawberries, citrus, etc., and their control.

f Richter, P.
Das Wittenberger Maiblumenanbaugebiet und seine klimatischen und edaphischen Bedingungen als Grundlagen seiner wirtschaftlichen Entwicklung. **(Lily-of-the-valley growing in the Wittenberg area, and the climatic and edaphic conditions on which its economic development has been based.)** [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1957, **5**: 177-251, bibl. 180, illus.
An area in which climate and soil favour pip development.

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Reunion of the genus *Opuntia* Mill.
Nat. Cactus Succ. J., 1958, **13**: 3-6, bibl. 6, illus.
Suggested reclassification of the Opuntioideae.

h van de Sande, J.
B 500 in chrysantenteelt. **(B 500 in chrysanthemum growing.)**
Cult. Hand., 1958, **24**: 65-6, bibl. 1.
Flowers dusted for *Botrytis* control. [See also *H.A.*, 28: 701.]

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Bestrijding van *Botrytis cinerea*, Pers. in cyclamenteelt. **(Control of *Botrytis* in cyclamen growing.)**
Cult. Hand., 1958, **24**: 168-9, 197-8, bibl. 1, illus.
With B 500 [see also *H.A.*, 28: 701].

j Schairer, J. F.
Growing orchids in the home and garden.
Gdn J. N.Y. bot. Gdn, 1958, **8**: 39-41, 69, bibl. 2, illus.

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La fusariosi delle Sansevieria ornamentali. **(Fusarium infection of ornamental sansevierias.)**
Studi sassaresi, Sez. III, 1953, **1**: 214-30, bibl. 50, illus., [received 1958].
A review, mentioning control with copper fungicides and ziram.

l Shoushan, A. M.
Anatomical study of lower ontogeny in *Lilium longiflorum.*
Bull. Fac. Agric. Cairo Univ., 1956, No. 72, pp. 3-6, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. 3, Abstr. 101,131.
The developmental anatomy of flowering.

m Shoushan, A. M., and Kabeel, M. T.
Studies of nitrogen, phosphorus and potassium fertilization of carnation, *Dianthus caryophyllus*, var. Hanasy.
Bull. Fac. Agric. Cairo Univ., 1956, No. 91, pp. 3-17, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. 3, Abstr. 101,130.
Grown in pots in Nile silt : manure compost.

n SHOUSHAN, A. M., AND KABEEL, M. T.
Studies of nitrogen, phosphorus and potassium fertilization of violet, *Viola odorata*, var. Princess of Wales.
Bull. Fac. Agric. Cairo Univ., 1956, No. 92, pp. 3-18, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,129.
Grown in pots in a 3 : 1 Nile silt : manure compost.

o STRYDOM, J. C.
Some attractive frost-resistant shrubs for the garden.
Pamphl. S. Afr. Dep. Agric. **354**, 1957-8, pp. 8, illus.
Chosen for freedom from diseases and pests, and their ornamental effect.

p VAN RENSSELAER, M.
A new cultivar: *Ginkgo biloba* Autumn Gold.
J. Calif. hort. Soc., 1956, **17**(3): 98-9, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 6201.
Vegetatively propagated, staminate, and suitable for roadside planting.

q WILSON, F. D., AND OTHERS.
Sansevieria for ornamental use.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 354-9, bibl. 8, illus.
Notes on species, hybrids, and selected variants.

r WYMAN, D.
Crab apples for ornamental fruit.
Arnoldia, 1956, **16**: 29-32 [received 1958].
Including dates when fruits of many varieties are colourful at the Arnold Arboretum.

s WYMAN, D.
Two new *Mahoberberis* hybrids.
Arnoldia, 1958, **18**: 9-12, bibl. 2, illus.
Notes on *M. aquicandidula* and *M. aquisargenti* of Swedish origin.

t ZIEGLER, G. A.
Home lawns.
Circ. Wis. agric. Ext. Serv. **445**, revised 1956, pp. 8, illus.
Advice on establishment, grass mixtures and maintenance.

u VAN ZON, A. Q., AND STEINER, A. A.
***Anthurium* in gravel culture.** [In Dutch.]
Vakbl. Bloemist., 1957, **12**: 389, from abstr. in *Informationsdienst Weihenstephan*, No. 1, 1958, p. 14.
Successful, using a nutrient solution of pH 5·5.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 2188, 2303, 2841, 3026x, 3183, 3195, 3201, 3211.)

2946. WHITEMAN, T. M.
Freezing points of fruits.
Citrus Ind., 1958, 39(3): 12-14, illus.

The highest temperatures at which the freezing of tissues occurs has been determined for a large number of tropical, sub-tropical and temperate fruits and vegetables by means of thermocouples and an electronic recording potentiometer. In general, only the highest freezing point found in a particular type of fruit or vegetable is recorded in this article, but some additional details are provided for avocadoes, grapefruit, oranges, tangelos, mangoes, nectarines and strawberries. Among all the fruits examined the highest freezing points ranged from 27·0 to 31·5° F. and among the vegetables from 29·0 to 31·9° F. It is hoped that the data will be assist those concerned in marketing to reduce or avoid freezing damage and loss.

2947. NORO, K., AND HACHIMURA, F.
On waxing fruits. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1956, **8**: 100-9, bibl. 17, illus., [received 1958].

With sand pears waxing helped to maintain the appearance of the fruit and to delay colour development. After 4 weeks in a wax coating the aldehyde content had increased to 20 mg. The appearance of the rind and pulp of the Wase Unshiu satsuma orange was satisfactorily maintained for about 1 month by a wax coating. With persimmons waxing had an adverse effect. Very little aldehyde was formed in treated fruits, and these became soft within a few days.

Avocadoes.

(*See also* 3026a, i, w, 3027 l, n, u.)

2948. JOHNSTON, J. C., AND FROLICH, E. F.
Avocado propagation.
Circ. Calif. agric. Exp. Stat. **463**, 1957, pp. 19, illus.

Clear instructions are given for raising avocado rootstocks from seed, for budding, grafting and topworking, and for growing plants from cuttings. Among the many points made are: Seeds can be stored successfully for several months at 40°–45° F. in dry moss, sand or sawdust. Germination can be hastened by cutting a thin slice off the tip and base of the seed. Budwood can be kept for 1 to 2 months in polythene bags held at 40°–45° F. Budding is best done in the spring or autumn; in the summer there is a tendency for the eyes to fall out. In California tip grafting on seedlings about ¼ in. in diameter is usually done in a glasshouse with temperatures exceeding the range of 55°–60° F. For topworking on decapitated stumps both the bark graft and the saw kerf or notch graft can be used. Cuttings of a few avocado varieties will root readily under mist or in propagators with a saturated atmosphere and bottom heat of about 70° F., but most varieties are shy-rooting. The difficult varieties can be induced to root by a system akin to stooling, in which shoots are encouraged to develop with their basal 2–3 in. kept etiolated from the start by excluding all light; these shoots are removed and struck as cuttings when 3–5 leaves have developed on the upper, exposed portion, or they can be girdled and rooted *in situ*.—Dep. subtrop. Hort., Riverside.

2949. HARKNESS, R. W., AND MALCOLM, J. L.
Iron chlorosis in avocados.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 297-300, bibl. 4.

Several chelated iron compounds were applied to the soil around chlorotic avocado trees at rates of 25 or 50 g. per tree. The most successful chelate was Compound 138 (H FeEDDTA), which in some cases raised leaf Fe content by 100 p.p.m.—Sub-trop. Exp. Stat., Homestead.

2950. WALLACE, A., AND BEDRI, A. A.
Iron and zinc foliage sprays.
Calif. Agric., 1958, **12**(3): 8, illus.

The uptake of labelled Fe and Zn from solutions by avocado and orange leaves was studied. The addition of 1% urea to the solution increased Fe uptake from EDDHA, but had the opposite effect with other chelates. Urea resulted in a decreased uptake of all the Zn compounds studied. A herbicidal oil and glycerol, both at 1%, also increased Fe uptake from EDDHA. Oil decreased the uptake of Zn compounds and glycerol decreased the uptake of some other Fe compounds. Zn sulphate was absorbed by the leaves about twice as readily as was the Zn chelate of EDTA. Inorganic Fe sprays resulted in an irregular green spotting, caused by the rapid formation of ferric hydroxide at normal pH levels. From 1% to 10% of the Fe absorbed by avocado leaves was translocated to the new growth in 17 days. In a limited field trial the addition of oil and urea to an Fe chelate spray improved the new growth of avocado trees in comparison with the chelate alone.

2951. BINGHAM, F. T., ZENTMYER, G. A., AND MARTIN, J. P.
Host nutrition in relation to *Phytophthora* root rot of avocado seedlings.
Phytopathology, 1958, **48**: 144-8, bibl. 24.

Avocado seedlings were grown in nutrient solution cultures under conditions of uniform nutrition except for N, P and K, which were supplied in graded amounts. *Phytophthora cinnamomi* was introduced into the nutrient cultures, and the resulting development of root rot was observed. A soil experiment was performed wherein observations were made of disease development of avocado seedlings in relation to various ratios of exchangeable Ca, Mg, K, Na and H. Root rot occurred in all treatments, but the progress of nfection was retarded where high concentrations of N or K had been used with the solution cultures. The retarding effect may have been due to a general salt concentration rather than to association specifically with N or K. Variations in the percentages of exchangeable cations in soil had no effect on the development of root rot of avocado seedlings. Adaptation of *P. cinnamomi* to such variations in environmental conditions precludes host nutrition as a practical means for control of the disease. [From authors' summary.] —Univ. Calif., Riverside.

2952. ZENTMYER, G. A., AND PAULUS, A. O.
***Phytophthora* avocado root rot.**
Circ. Calif. agric. Exp. Stat. **465**, 1957, pp. 15, illus.

The symptoms caused by *P. cinnamomi* are described. Infection may be introduced by the movement of the infected soil or water, the use of infected avocado seeds or nursery stock, or by numerous alternate host plants, which are listed. Among measures which help to prevent the spread of the disease or to mitigate its effects are: Avocado seeds can be cleaned by hot-water treatment at 120°–125° F. for 30 min. Nursery soil can be effectively sterilized with methyl bromide or steam, and tools with formaldehyde. The best chemicals so far found for treating affected areas in groves are Vapam, D-D and Telone; methyl bromide is also effective in light, but not in heavy soils. For, reasons not yet understood, development of the disease in infected trees can be retarded if alfalfa meal is applied in the early stages at 100–150 lb. per tree. Work is in progress on fungicidal treatment of infected trees and on the development of resistant rootstocks.—Univ. Calif., Riverside.

2953. WOLFENBARGER, D. O.
Test work on some sub-tropical fruits and ornamental plants in connection with the Mediterranean fruit fly.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 275-7.

Populations of the avocado red mite (*Oligonychus yothersi*) were significantly reduced on avocado trees by malathion sprays applied to control the Mediterranean fruit fly. Fumigation of mangoes and pineapples was successful at 10 oz. ethylene dibromide per 1,000 cu. ft. for 2 hours. Fumigation of avocadoes and papaws is not recommended, but dips show promise for avocadoes. Ethylene dibromide emulsion dips at 1:15,000 were, in general, satisfactory for nursery and greenhouse plants.—Sub-trop. Exp. Stat., Homestead.

Citrus—varieties, propagation and rootstocks.

(*See also* 2059, 2150, 2238 l, 3026d, e, s, u, 3027e, 3213.)

2954. NISHIURA, M., MATSUSHIMA, J., AND OKUDAI, N.
Studies on the identification of citrus species and on distinguishing hybrids from nucellar seedlings. 1. Colour reaction method with leaf extracts. [Japanese, with English summary ½ p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1957, No. 4, pp. 19-26, bibl. 7.

When the Almen reagent colour test was applied to water extracts of dried leaf powder obtained from citrus plants raised at the Tôkai-Kinki station, each species of citrus showed a specific colour reaction. Nucellar seedlings developed the same colours as their parents, whereas hybrid seedlings developed colours which were commonly intermediate between their two parents and sometimes similar to those of the male species. In some crosses the colour test was a more reliable means of identifying hybrids than was examination of morphological characters, but it was of little value when the two species crossed had similar colour reactions.

2955. Jan, S.
The effect of removing the seed coat and of chemical treatment of seeds of *Citrus sinensis* var. *sekkan* and *Euphoria longana* on germination and early stages of seedling development. [Chinese, with English summary.]
Acta agric. sinica, 1956, **7**: 465-73, from *Ref. Ž.* (*Biol.*), 1957, No. 23, Abstr. 97,112.

Removal of the seed coat and treatment of the seeds with potassium permanganate, KBr and $NaHCO_3$ improved germination and early growth in both these species.

2956. Khan, M. S.
A preliminary note on the budtake studies in sour orange stock.
Agric. Pakist., 1957, **8**: 396.

Rubber strips for wrapping the inserted buds were more convenient to use, provided better protection, and gave a much higher percentage take than fibre. In a time-of-budding study, August, when temperatures varied from 78·5° F. to 108° F. with a high R.H., proved the most successful month.

2957. Chapot, —.
Les porte-greffes des agrumes. **(Citrus rootstocks.)**
Terre maroc., 1958, **32**: 93-5.

The characteristics as rootstocks of trifoliate orange, Troyer citrange, Cleopatra mandarin, rough lemon, sweet orange, Rangpur lime, Palestine lime and the unsatisfactory local stocks, M'Guergues and Rhobs el Arsa, are compared with those of sour orange. Cleopatra has given promising results in Morocco.

2958. Nankivell, W. I.
Rootstocks. Progress report on selected orange varieties planted 1949 in Mildura and Cobram districts.
Citrus News, 1957, **33**: 145.

First reports from a variety trial show that Symons Washington Navel has given slightly higher yields than Leng Navel, although the latter has produced a bigger tree and better fruit quality. The O. G. Leng Valencia is very vigorous but has so far been a shy bearer. Brix and acidity have been higher in Leng Valencia than in Newton Valencia. The Symons strain sweet orange is still recommended as the rootstock for deep well-drained sands. Citronelle is recommended for early maturity or where periods of moisture stress occur.

2959. Venning, F. D.
Trials with *Swinglea glutinosa* (Blanco) Merr. as a rootstock for citrus.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 306-7, bibl. 1.

Scions of several citrus varieties were top-grafted to seedlings of Tabog, the Philippine *S. glutinosa*, and their growth was compared with that of scions on sour orange. Orange, grapefruit and mandarin scions grew more slowly than on sour orange, but the growth of acid types of citrus was more vigorous than on sour orange, with Tahiti lime outstanding.—Int. Coop. Admin., Havana.

Citrus—planting, soil management and nutrition.

(*See also* 2950, 3026c, r, z, 3027b.)

2960. Grimm, G. R.
Factors affecting dieback and growth responses of young transplanted citrus trees.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 82-5, bibl. 1.

Valencia orange trees on rough lemon rootstock (⅝ in. trunk diameter) were used in a study of factors affecting transplanting success. Data taken 3½ months after transplanting showed that protection of the roots from drying out was the most important single factor for promoting vigorous tree growth. Significant differences between types of pruning and between methods of watering were dependent on root condition. There was no significant difference between trees planted with leaves and those without leaves. Results showed that trees pruned to leave branches 7–9 in. long, which retained their leaves, and were prevented from drying while out of the ground are the most likely to survive transplanting.—U.S.D.A., Orlando.

2961. Martin, J. P., and Ervin, J. O.
Greenhouse studies on influence of other crops and of organic materials on growth of orange seedlings in old citrus soil.
Soil Sci., 1958, **85**: 141-7, bibl. 25, illus.

With growth in noncitrus check soils rated 100, growth of orange seedlings in 146 old citrus soils ranged from 17 to 100%. Sour orange seedlings made more than twice as much growth in walnut orchard soil as in an adjacent old citrus soil, but 16 other crop species grew just as well in the old citrus soil. Out of 22 organic materials only one, namely, pine needles, increased growth of citrus seedlings in an old citrus soil. Twelve legume companion crops exerted little or no effect on growth of seedlings in old citrus soil. Rotation crops exerted variable effects on growth of orange seedlings in two old citrus soils, but the majority tended to increase growth. In general, grass crops were more effective than legume crops. None of the rotation crops in Hanford sandy loam raised growth of the seedlings to the status of that in non-citrus soil. In Yolo sandy loam a rotation crop of Brome grass was almost as effective as fumigation in stimulating growth. [From authors' summary.]—Univ. Calif., Riverside.

2962. Culaja, V. I., and Šeftel', I. M.
Trench cultivation of citrus in Central Asia. [Russian.]
Agrobiologija, 1958, No. 1, pp. 102-8, illus.

In the arid subtropics of Central Asia citrus is grown in trenches running from east to west and is provided in the winter with a protective covering of frames and boards or mats. Commercial trench cultivation started in 1949 and citrus self-sufficiency in the Asiatic part of the U.S.S.R. is envisaged. Lemon is by far the most important crop, and Meyer is the most suitable variety in spite of its somewhat low vitamin C and acid contents. Orange growing was started recently with the varieties Hamlin, Washington Navel and Sočinskij. Among rootstocks tested seedlings and vegetatively propagated plants of the Meyer lemon have proved the best and a slow-growing form of sour orange also shows promise. In spite of high production costs trench cultivation of citrus is considered an economical proposition. To reduce the cost of the covers the replacement of wood by metal and of glass by plastic film is suggested.

2963. Chapman, H. D., and others.
Citrus trees in water cultures.
Calif. Agric., 1958, **12**(3): 3-4, illus.

The equipment used to grow citrus trees of fruiting size in water culture to study their responses to varying nutrient levels is described. Experiments briefly summarized include those on optimum K levels, period of maximum N uptake, and the effects of seasonal N supply.

2964. Harding, R. B., Pratt, P. F., and Jones, W. W.
Changes in salinity, nitrogen, and soil reaction in a differentially fertilized irrigated soil.
Soil Sci., 1958, **85**: 177-84, bibl. 10.

Salinity changes in the soil of an irrigated orange orchard during 28 years of differential fertilization have been investigated. Effects of 24 different treatments were studied. Treatments which in previous studies were shown to result in physical deterioration of the soil and marked reduction in water penetration were shown in the present study to cause the greatest increases in soil salinity, namely treatments including $NaNO_3$ and $(NH_4)_2SO_4$ fertilizers. Considerable N accumulated in soil where these materials were applied. Limestone was effective in the $(NH_4)_2SO_4$ treatment in reducing soil salinity and increasing soil pH. Gypsum was of benefit in $NaNO_3$ plots by reducing soluble Na and soil salinity, but did not result in so great a reduction of salinity as did limestone applied with $(NH_4)_2SO_4$. Winter cover crops were more effective in reducing soil salinity with $(NH_4)_2SO_4$ than with $NaNO_3$. Soils treated with $Ca(NO_3)_2$ or bulky organic materials, such as manure or cotton seed meal, had low salinity levels. Where mixed fertilizers were applied without manure, there were marked increases in soil salinity. The application of sulfur as a soil amendment usually resulted in higher soil salinity though lower percentages of soluble Na. Of plots receiving concentrated sources of nitrogen, those given $Ca(NO_3)_2$ and urea had the lowest amounts of soluble salts in the soil. A highly significant negative correlation was found between yields of fruit and soil salinity, although the close association between water penetration, available soil moisture, and soil salinity is recognized. [Authors' summary.]—Univ. Calif., Riverside.

2965. Philippe, J.
Compte rendu d'un premier essai de fumure minérale sur agrumes entrepris au Congo Belge. **(Report of a preliminary trial with mineral fertilizer on citrus in the Belgian Congo.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 67-9, illus.

Mandarins grafted on rough lemon and grown on alluvial soil without manuring for 16 years were supplied annually for the 3 following years with 800 g. N, 300 g. P_2O_5 and 500 g. K_2O per tree. Treatment greatly increased plant vigour, and over the experimental period fruit yield was 3 times as high as from untreated trees, though fruit quality was slightly reduced.

2966. Lynch, S. J., and Goldweber, S.
Effect of nitrogen and timing of applications on Persian limes.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 323-6, bibl. 2.

In preliminary studies Persian lime trees received side dressings of N between complete 4–6–6 fertilizer applications. Nitrate of potash and Uramon both resulted in increased yields, but yields were reduced by sulphate of ammonia. Variation of the percentage of natural organic N in the complete fertilizer had little effect on yield, fruit size or tree growth. Fruit yields were reduced when the intervals between fertilizer applications were increased, but trunk area growth was not affected.—Univ. Miami, Coral Gables.

2967. Wedding, R. T., and Riehl, L. A.
Influence of petroleum oil on the translocation of phosphorus in small lemon plants.
Amer. J. Bot., 1958, **45**: 138-42, bibl. 6.

Applications of a petroleum oil of the type used in insect control on citrus have been shown to inhibit the translocation of radioactive phosphate to the leaves of small, rooted lemon cuttings. The percentage inhibition of translocation is proportional to the logarithm of the amount of oil deposited per unit leaf area. The effect of deposits of less than 150 $\mu g./cm.^2$ decreases within 7 days and cannot be detected after 30 days. Deposits in the range of 350–400 $\mu g./cm.^2$ remain as effective 30 days after application of the oil as they were initially. Phosphate transport was inhibited whether the P^{32} was applied to the stem of the plants or taken up by the roots. However, the pattern of phosphate distribution between the two leaves of the experimental plants when applications of the phosphate were made to the soil was different from that when applications were made to the stem. [Authors' summary.]—Univ. Calif., Riverside.

2968. Bunina, N. N.
The effect of phosphoric acid fertilizers on the development of trifoliate seedlings and wildings. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 3, pp. 108-16, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,336.

In Georgia P fertilizers applied before sowing trifoliate orange seed or planting wildings had little effect on the growth of the aerial parts but improved development of the root system. The effectiveness of P was particularly marked in light alluvial soils. In drought years increasing the rate of P had no effect.

2969. Brusca, J. N., and Haas, A. R. C.
Chlorine absorption.
Calif. Agric., 1958, **12**(3): 9, 11-12, illus.

The effect of various concentrations of chlorine ranging from 0 to 1,680 p.p.m. was studied in pot tests with Lisbon lemons on sour orange stocks. The percentage of Cl in dry matter of the leaves was 0·188% at 560 p.p.m. and 1·035% at 840 p.p.m. At levels up to 560 p.p.m. the Cl percentage in dry matter of fine rootlets was much higher than in the corresponding leaves; above this level Cl percentages were higher in the leaves than in the rootlets. Orange blossoms also showed a sudden increase in Cl content above

560 p.p.m. In pulp and peel Cl percentages showed little variation up to a level of 210 p.p.m., but above this level there were considerable accumulations of Cl. In a pot experiment involving several levels of ammonium sulphate, the sulphate content of orange flowers increased to a maximum of 0·51% of dry weight when the sulphate concentration supplied was 768 p.p.m.

Citrus—growth and fruiting.

(*See also* 3026f, g, n.)

2970. Dubrovickaja, N. I., and Krenke, A. N.
Changes due to age in certain characteristics of lemons. [Russian.]
Bjul. Gl. botan. Sada AN SSSR, 1956, No. 25, pp. 104-11, bibl. 11, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,865.

Studies on Novogruzinsk and Meyer lemons showed that seedlings are morphologically and physiologically younger than are lateral shoots of the same calendar age. The comparison was based on extension growth, the dynamics and duration of leaf growth, the time of the appearance of spines, anatomical and histochemical analyses (determinations of starch, sugar, fat, peroxidase and heteroauxin) and intensity of respiration.

2971. Mamporija, F. D.
The effect of the male parent on the nucellar cells of citrus. [Russian.]
Agrobiologija, 1957, No. 5, pp. 119-31, bibl. 18, illus.

When Washington Navel orange and Unshiu mandarin were pollinated by *Poncirus trifoliata* most of the seeds produced gave rise to nucellar seedlings resembling the mother trees. However, when the same orange and mandarin were pollinated by *Citrus ichangensis* most of the seedlings produced were hybrids. The development of the cells of both nucellar and sexual embryos in these seeds was studied in some detail. These studies indicate that the pollen of *C. ichangensis*, in contrast to that of *P. trifoliata*, influences the development of the nucellar as well as the sexual embryos. It is suggested that this discovery could be made use of in developing nucellar strains with various desirable characteristics such as frost resistance.

2972. Hield, H. Z., Coggins, C. W., Jr., and Garber, M. J.
Gibberellin tested on citrus.
Calif. Agric., 1958, **12**(5): 9-11, illus.

In preliminary experiments certain gibberellin treatments have increased fruit set of lime, lemon and orange trees. GA at 100 and 1,000 p.p.m. increased fruit set of Bearss lime from 58% on control trees to 86% and 79% respectively. On Eureka lemon trees fruit set was significantly improved by 1,000 p.p.m. GA. Fruit set of Washington Navel oranges was increased by applications of the potassium salt of GA during the late flowering period; rates of 250 p.p.m. and 1,000 p.p.m. gave significant improvements. No significant effect on fruit size was observed.

2973. Soost, R. K.
Gibberellic acid on mandarin.
Calif. Agric., 1958, **12**(5): 5, illus.

When GA at 1,000 p.p.m. in 95% ethanol was applied to 244 self-pollinated Clementine flowers when fully opened, 35 fruits were set, whereas only 2 fruits were set from 247 untreated flowers. The fruits set by GA were seedless and weighed less than fruits produced by hand- or open-pollination; they also had more of a neck and were longer than normal fruits.

2974. Bain, J. M.
Morphological, anatomical, and physiological changes in the developing fruit of the Valencia orange, *Citrus sinensis* (L.) Osbeck.
Aust. J. Bot., 1958, **6**: 1-24, bibl. 31, illus.

Measurements of fruit radius and peel and pulp width, as well as determinations of fresh weight, dry weight, moisture content, total and protein nitrogen content, and respiration rate were made throughout two growing seasons on Valencia oranges from the Gosford district of New South Wales. Soluble solids, sugar, and acid were also determined in the juice. Anatomical changes during development were investigated throughout one season. Development could be divided into three stages, corresponding with changes in growth rate and coinciding on a calendar basis in both seasons. Stage I varied in length according to the date of the blossom, [Nov. 17th, 1953, and Oct. 18th, 1954], but was completed by mid-December. This was the cell division stage; by mid-Decmber cell division was completed in all tissues except the outermost cell layers. Increase in fruit size at this stage was mainly due to increased peel thickness. Stage II, a period of very rapid growth from mid-December to mid-July, was the critical period for growth and was distinguished as the cell enlargement period, rapid morphological and physiological changes occurring in the absence of cell division. The growth of the pulp was responsible for most of the increase in fruit size during Stage II; the peel reached a maximum width early in the stage and then became thinner with very little subsequent change in thickness as the pulp continued to increase in size. Stage III, the maturation period, lasted from mid-July until the fruit was ripe, or approximately 7 months. Fruit continued to grow for as long as it was left on the tree but at a very reduced rate compared with Stage II. Ripening occurred during Stage III. [Author's summary.—C.S.I.R.O., Homebush, N.S.W.

Citrus—frost effects.

2975. Scaramella Petri, P., and Strigoli, P.
I fattori ecologici e la sessualità dei fiori del *Citrus trifoliata*. (**Ecological factors and flower sex in *Citrus trifoliata*.**) [English, French and German summaries 9 lines each.]
Frutticoltura, 1958, **20**: 53-8, illus.

After intensely cold weather in Bologna and Florence, *Citrus* [*Poncirus*] *trifoliata* produced flowers of 3 types: hermaphrodite, functionally male and completely male. Those of the last type had increased numbers of stamens with enlarged anthers and very short filaments. The petals were reduced or increased in number and irregular in size. In some instances the male flowers developed on stalks in the same spine-axils as the normally solitary and sessile hermaphrodite flowers d opened after these had set fruit. In normal years e lower branches and some basal parts of younger ranches produced flowers with abortive pistils but ne without pistils.—Ist. bot. Univ. Bologna.

76. Mirimanjan, V. A.
The problem of developing methods of diagnosing frost resistance in subtropical plants. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1958, **23**(3): 17-19, bibl. 3.

the factors which are indicative of frost resistance citrus, which were described earlier [see *H.A.*, 27: 21], another is now added, namely the resistance of ter soluble proteins to the coagulating action of turated ammonium sulphate. Experiments with 4 pes of citrus and 2 of tea have shown that in the rdier types of plant the time required for the proteins begin coagulating is longer than in the more sensitive nts.

77. Turrell, F. M., and others.
Recovery of citrus from freezing.
Calif. Citrogr., 1958, **43**: 151, 162.

ne effects of wind machine operation in preventing ezing damage have been studied in the field and are cussed. It is suggested that wind machines may be pful in hardening citrus when several light frosts cur before a severe frost.

8. (Kyle, W. T., and McAteer, J. E.)
Frost detector.
Amer. Fruit Gr, 1958, **78**(5): 33.

machine has been developed at the University of ifornia, Los Angeles, to detect frost damage in rus fruit by measuring the resistance encountered X-rays, registered as a voltage reading. As frost mage increases, the voltage reading increases as a ult of non-uniformity of fruit sections. It is mated that a commercial model, which could ndle 10 fruits per second, could be built for $10,000 20,000.

Citrus—disorders, diseases and pests.

(*See also* 2511c, g, 2945e, 3026b, j, o-q, 3027a, j, m, r, s, 3033.)

'9. Ryan, G. F.
Albinism in citrus seedlings.
Calif. Agric., 1958, **12**(3): 7, 12.
Ryan, J. F., and Stein, E.
Albinism in citrus seedlings.
Calif. Citrogr., 1958, **43**: 293-5, bibl. 5.

eral treatments of Cleopatra mandarin seeds have ulted in 100% normal green seedlings. Successful tments were dusting with Fermate, Phygon XL or san, or dipping for 1 minute in 8-hydroxyquinoline, 8-hydroxyquinoline sulphate. Treatment with 8-roxyquinoline sulphate lowered seed viability after first month of storage. Arasan had a markedly eficial effect on viability during 12 months' storage, most of the other fungicides had a similar effect for onths. The possible causes of albinism in citrus dlings are discussed.

2980. Platt, R. G.
Leaf drop, fruit drop and twig die back.
Calif. Citrogr., 1958, **43**: 192, 207-9.

Leaf drop, fruit drop and twig die-back is not a new disorder in California, but it has become much more prevalent in the past year, especially in Navel orange orchards. Numerous surveys and observations have been made with the object of trying to determine its cause. Based on these, the following suggestions are made for preventing or reducing future attacks: adequate irrigation (especially in autumn and winter), good pest control, the maintenance of the trees in a vigorous condition (including the severe pruning of mature oranges), and the gradual replacement of old orchards.

2981. Carpenter, J. B., and Hield, H. Z.
Accentuation of blue albedo in Marsh grapefruit by sizing sprays with 2,4,5-T.
Plant Dis. Reptr, 1958, **42**: 63-4, bibl. 2.

Small fruits with blue albedo are characteristic of stubborn virus of citrus. Applications of 2,4,5-T greatly increased the number of stubborn-like fruits produced by Marsh grapefruit trees.—Agric. Res. Serv., U.S.D.A., and Univ. Calif., Riverside.

2982. Agarwala, R. K., and Tandon, R. N.
Studies of the anthracnose of lime trees in Uttar Pradesh.
Indian J. agric. Sci., 1957, **27**: 205-9, bibl. 14, illus.

Three applications of 5 : 5 : 50 bordeaux mixture and of 0·33% Peronox, combined with orchard sanitation, reduced infection of *Gloeosporium limetticolum* from 38% to 7%.

2983. Klotz, L. J., Wong, P.-P., and DeWolfe, T. A.
Damping-off of sweet orange seedlings by *Rhizoctonia solani* controlled with biphenyl.
Plant Dis. Reptr, 1958, **42**: 464-6, bibl. 1, illus.

Biphenyl at rates of 5 to 40 g. per gal. effectively controlled damping-off (*Rhizoctonia solani*) in citrus seedlings, but at all the rates used there were indications of phytotoxicity, which resulted in reduced germination and slower emergence.—Univ. Calif., Riverside.

2984. Prota, U.
Prime ricerche sul marciume pedale degli agrumi in Sardegna. (**First studies of foot rot of citrus in Sardinia.**)
Studi sassaresi, Sez. III, 1954, **2**: 3-22, bibl. 22, illus., [received 1958].

Resistance to *Phytophthora citrophthora* was high in sour and trifoliate oranges, moderate in Biondo Comune sweet orange, grapefruit, Monachello and Testa di turco lemons, bergamot and Clementine oranges, and poor in citron and certain lemon varieties.

2985. Taylor, C. E.
The black citrus aphid.
Rhod. agric. J., 1958, **55**: 192-4, illus.

Toxoptera citricidus can be controlled by nicotine sulphate, 1 in 800 solution, or by malathion, 3 lb. of

25% w.p. or 1½ pints of 50% miscible liquid in 100 gal. water, or by metasystox spray at 16 oz. per 100 gal. water. Banding the trunks of trees with dieldrin suspension against ants is also useful.

2986. Georgala, M. B.
Fruit fly control.
Citrus Gr, 1958, No. 292, pp. 1-2.

Mediterranean fly, *Ceratitis capitata*, and Natal fly, *Pterandrus rosa*, on citrus may be controlled with baits of 2 oz. 15% malathion w.p., 3 lb. sugar and 4 gal. water applied as coarse droplets to the foliage at weekly intervals commencing well before fruit stinging is observed. Baiting should be combined with normal orchard sanitation measures.

2987. Bartlett, B. R.
Biotic factors in natural control of citrus mealybugs in California.
J. econ. Ent., 1957, **50**: 753-5, bibl. 3.

Localized outbreaks of citrus mealybugs, *Pseudococcus citri*, frequently are associated with the destruction of natural enemies by DDT drift from adjoining cultivated crop areas. A seasonal evaluation of the effectiveness of the natural enemies of citrus mealybugs was made by associating their natural abundance with the increase and decline of mealybug populations in three areas, one where natural enemies remained undisturbed, a second area where certain natural enemies were restricted by surrounding the untreated plot with a barricade of DDT-treated trees, and a third area where natural enemies were restricted by direct application of DDT to the trees. From the seasonal mealybug population changes in the three plots and the natural enemy associations, an assessment of parasitic and predator effectiveness has been isolated from abiotic factors including the effects of DDT on the host population. *Cryptolaemus montrouzieri* was found to be a very effective predator at high host densities. In this experiment the parasite *Leptomastidea abnormis* was associated with citrus mealybug population decrease at periods of low host density. [From author's summary.]—Univ. Calif., Riverside.

2988. Jeppson, L. R.
Chlorobenzilate for mite control on citrus.
Calif. Citrogr., 1958, **43**: 192, 218-19, bibl. 2.

Recommendations are given for controlling 6 mite species by chlorobenzilate. Sprays of ½ lb. 25% wettable powder or ½ pint 25% emulsifiable concentrate in 100 gal., have given effective control of the citrus bud mite (*Aceria sheldoni*). Recent studies have shown that chlorobenzilate applications from June to October were the most effective. Chlorobenzilate may be used as an emergency summer treatment for controlling the rust mite (*Phyllocoptruta oleivora*), or as a replacement for sulphur in the normal control programme. An emergency summer treatment for the citrus flat mite (*Brevipalpus lewisi*) may be provided by using chlorobenzilate at ¾ lb. w.p. or ¾ pint e.c. in 100 gal. of water. Chlorobenzilate at 1 lb. w.p. or 1 pint e.c. per 100 gal. has given excellent control of the 6-spotted mite (*Eotetranychus sexmaculatus*), the Yuma mite (*E. yumensis*) and the Lewis mite (*E. lewisi*).

2989. King, J. R., and Johnson, R. B.
Comparison of experimental miticides for the control of purple mite, *Metatetranychus citri* (McC.) on citrus.
Proc. Fla St. hort. Soc., *1957*, 1958, **70**: 69-75, bibl. 2.

In trials Tedion 25W at ¾ lb. per 100 gal. and Trithion at 1 lb. gave better mite control than the usually recommended acaricides DN Dry Mix No. 1 and Systox. Kelthane 25 W at 1 lb. per 100 gal. gave control equal to that of the 2 recommended acaricides. Tedion was the most persistent compound tested.—Fla Citrus Exp. Stat., Lake Alfred.

2990. Johnson, R. B., King, J. R., and McBride, J. J., Jr.
Zineb controls citrus rust mite.
Proc. Fla St. hort. Soc., *1957*, 1958, **70**: 38-48, bibl. 7.
Citrus Ind., 1958, **39**(2): 20-9, bibl. 7.

Preliminary results have shown that citrus rust mite (*Phyllocoptruta oleivora*) may be controlled from December to October more effectively with zineb than with wettable sulphur. Post-blossom applications of zineb were more effective than pre-blossom applications. No significant difference in control could be detected between 10 lb. wettable S and ½ to 1 lb. of zineb, maneb or chlorobenzilate applied in January. Zineb or maneb at ¼ lb./100 gal. and chlorobenzilate at ½ lb. were superior to wettable S in May applications. Nabam without the addition of zinc sulphate caused scorch and was less effective than zineb or wettable S. Foliage residues of zineb were quite persistent especially when used with oil emulsions.—Fla Citrus Exp. Stat., Lake Alfred.

2991. Thompson, W. L., and Deszyck, E. J.
Phosphatic insecticides mixed with oil emulsions for scale control and their effect on fruit quality.
Proc. Fla St. hort. Soc., *1957*, 1958, **70**: 31-8, bibl. 5.
Citrus Ind., 1958, **39**(3): 7-8, 28-9, bibl. 5.

Malathion at 0·5 or 0·75 lb. technical malathion per 100 gal. plus 0·7% oil controlled scales effectively, but control with 0·15 lb. parathion plus 0·7% oil was better. Chlorthion was effective when supplemented by 0·7% oil. Neither malathion nor parathion alone affected the soluble solids contents of the juice but contents were reduced by oil supplements. Fruit colour was best in plots sprayed with malathion or parathion alone. Degreening was retarded more by 1·3% oil than by 0·7% oil.—Fla Citrus Exp. Stat., Lake Alfred.

2992. Whitehead, V. B., Kriegler, P. J., and Joubert, G. F.
Scale control in the Citrusdal area.
Fmg S. Afr., 1958, **33**(11): 19, 21, 27, illus.

Spraying experiments [not described here] against red and soft scales have led to the following recommendations: For control of light to medium infestations of scales one combination spray of parathion plus malathion or of parathion plus oil should be applied between petal fall and the end of December. For control of heavy infestations of red and soft scales two combination sprays of these materials, applied 5–8 eeks apart, are recommended. A parathion spray at etal fall followed by a parathion-malathion spray -8 weeks later is recommended for control of heavy festations of red scale alone.—W. Province Fruit Res. tat., Stellenbosch.

itrus—fruit handling, storage and composition.

(*See also* 2717r, 3026h, t.)

993. Phillips, R. V., and Grierson, W.
Cost advantages of bulk handling through the packing house.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 171-7, bibl. 3, illus.

he development and present system of bulk handling trus in Florida are described and the savings in cost y this method analysed. These have been 6–7 cents er 90 lb. box in the field plus 2–3 cents in the packing ouse. The cost of conversion to bulk operation is igh. In the case of one large co-operative, buildings ost approximately $125,000 and field equipment 35,000, but, with a crop of nearly 2 million boxes, this apital outlay should be repaid in 3 to 4 years.—aines City Citrus Grs' Ass., and Fla Citrus Exp. Stat.

994. Grierson, W.
The effect of pack-out on grower profits.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 21-8, bibl. 15.

he effect of percentage of packable fruit on growers' rofits obtained from grapefruit, tangerines and oranges as been evaluated over a wide range of prices. An uation is given for calculating the pack-out required break even, and the relationships between F.O.B. ces for fresh fruit, cannery prices for eliminations, rcentage pack-out and profits are shown graphically. Fla Citrus Exp. Stat., Lake Alfred.

995. Grierson, W.
Preliminary studies on cooling Florida oranges prior to packing.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 264-72, bibl. 63, illus.
Citrus Ind., 1958, **20**(8): 12-14, 18-24, 27, 30, bibl. 63, illus.

ydrocooling shows promise for precooling oranges efore they are packed in fibreboard cartons. The ossibilities of using hydrocooling in this way are iscussed in the light of studies made in Florida and sewhere, but it is concluded that further investigaions are needed, particularly on possible damage due o physiological shock and on methods of drying the uit before packing.

996. Grierson, W.
Indicator papers for detecting damage to citrus fruit.
Circ. Fla agric. Exp. Stats **S-102**, 1958, pp. 4, bibl. 4, illus.

ilter paper or chromatography paper is soaked for minutes in a mixture of 150 ml. of solution A plus 00 ml. of solution B plus 250 ml. of water. Solution A onsists of 1·5 g. phenolphthalein powder, 1·5 g. odium hydroxide and 150 ml. isopropanol. Soluion B consists of 0·75 g. oil-soluble Victoria blue plus 00 ml. acetone. The purple-dyed, dried paper turns ellow-green in presence of citrus peel oil and blue presence of juice.—Citrus Exp. Stat. Fla.

2997. Harding, P. L., Soule, M. J., Jr., and Sunday, M. B.
Storage studies on Marsh grapefruit—1955-56 season. I. Effect of nitrogen and potash fertilization on keeping quality. II. Effect of different temperature combinations on keeping quality.
Citrus Ind., 1958, **39**(2): 8-16, 35-6, bibl. 9.

Storage tests indicated that fertilization with 3 levels of N or K has less influence on the incidence of pitting and decay than have fruit maturity and conditions during storage and marketing. In storage at 50° F. for 8 weeks there was little pitting or decay, but in storage at 40° F. nearly all fruits showed pitting. Pitting increased rapidly during a 7-day holding period at 70° F. on fruit previously stored at 32° F. for 8 weeks. There was no pitting and only slow decay development in fruit stored for 1 week at 50° F. and then held for 28 days at 70° F. No consistent relationship between levels of N and K fertilization and pitting and decay was apparent. In storage tests with fruit from commercial packhouses very little pitting or other rind breakdown developed until the last 2 pickings, and the trouble was generally more severe at 32° F. than at other temperatures. Fruit picked earlier in the season could be stored for longer periods with less development of decay. At 50° F. more decay developed during storage than at 40° or 32° F. Storage at 50° F. for 1–2 weeks before storage at 32° F. eliminated surface browning found in fruits stored continuously at 32° F. Less decay developed during the holding period when the fruit was stored for 1–2 weeks at 50° F. before storage at 32° F.—Quality Maintenance and Improvement Sect., Orlando, Fla.

2998. Tanaka, S., and others.
Studies on the control of citrus fruit decay in storage. V. Survey of fruit decay of Satsuma orange in storage. (2). VI. Experiments on the chemical control of citrus fruit decay. (2).
[Japanese, with English summaries $\frac{1}{2}$ and $\frac{3}{4}$ p.]
Bull. Tôkai-Kinki agric. Exp. Stat., hort. Div., 1957, No. 4, pp. 37-43, bibl. 3, and pp. 44-65, bibl. 19.

The first paper describes the frequency with which storage diseases have occurred in a store of Satsuma oranges. Improved ventilation markedly reduced decay.

The second paper describes the effect of various fungicides in controlling decays. Citrol (thiourea) sprays gave good fungus control but caused blackening of the calyx. Serious defoliation was induced by preharvest sprays of Citrol, but the addition of 2,4-D amine (20 p.p.m.) to Citrol improved decay control and reduced calyx blackening. Rind shrinkage was caused by a combined spray of 1% sodium-o-phenylphenate and 0·5% hexamine to harvested fruits, but decay control was good; the addition of 2,4-D to this spray increased its fungicidal effect and decreased calyx blackening. Preharvest spraying with an "invert" soap, Oronine, was effective in reducing decay and in keeping fruits fresh, but post-harvest sprays had no effect. No responses of practical value were observed following treatment with mercury fungicides, diphenyl PCP, lime sulphur, thiocarbamates or thiocyanate.

Wax treatment had no effect in controlling decay, but wax containing fungicides showed promise.

2999. Deetlefs, J. du T., Cresswell, G., and Naude, C. J.
Studies on the effect of various fungicides and methods of application that can be utilized in citrus packing houses.
Citrus Gr, 1958, No. 290, pp. 1-8.

Increasing the temperature of the hot water tank to 120° or 125° F. had no effect on the development of black spot, but permitted more effective elimination of insect-stung fruit which bubbled more freely. The fungicidal action of 0·15% sodium-o-phenylphenate at 120° F. was as efficient as 2·0% at 90° F. Rinsing and bleaching prior to disinfection was more effective than the reverse procedure.

3000. Berry, S. Z.
Relative effects of ethyl thionocarbamate and Dowicide A-Hexamine on four citrus fruit pathogens.
Plant Dis. Reptr, 1958, **42**: 467-73, bibl. 5.

Five per cent. ethyl thionocarbamate, C.P. 2229, was demonstrated to be more inhibiting than 2% Dowicide A-Hexamine to orange decay produced by *Diplodia natalensis*, *Phomopsis citri*, *Penicillium digitatum* and *Penicillium italicum*. Both formulations were fungistatic to the four pathogens. *In vivo* neither chemical showed specificity for *D. natalensis* or *P. citri*. However, C.P. 2229 controlled decay produced by *P. digitatum* more effectively than that produced by *P. italicum*; the latter became more marked after the treated oranges were stored for 3 weeks. *In vitro* the inhibition produced by C.P. 2229 on the four citrus pathogens was less than that of the commercial Dowicide A-Hexamine. Neither formulation *in vitro* showed specificity for *D. natalensis* or *P. citri*. However, the two chemicals were specific for *Penicillium*, each being more effective against *P. digitatum* than against *P. italicum*. [Authors' abstract.]—Agric. Mktg Serv., Orlando, Fla.

3001. Berry, S. Z.
Effects of an ethylene dichloride and trichlorethane mixture on three citrus fruit pathogens.
Plant Dis. Reptr, 1958, **42**: 102-6 bibl. 3, illus.

Spore germination of *Diplodia natalensis*, *Phomopsis citri* and *Penicillium digitatum* was inhibited during exposure to a mixture of ethylene dichloride and trichlorethane gas for 6, 10, 20 and 30 hours. A 6-hour exposure to the mixture controlled decay in oranges for 1 week, but the effect was lost rapidly during the second week after treatment. A 16-hour exposure was only slightly more effective than a 6-hour exposure.—U.S.D.A., Orlando, Fla.

3002. Long, W. G., Harding, P. L., and Soule, M. J., Jr.
The ascorbic acid concentrations of grapefruit of different sizes.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 17-21, bibl. 13.
Citrus Ind., 1958, **39**(5): 9-10, 21, bibl. 13.

Small fruit of Marsh and Duncan grapefruits had a higher ascorbic acid concentration, but a lower total content, than larger fruits. The average ascorbic acid content of Marsh fruits was lower than that of Duncan fruits.—Agric. Mkting Serv., Orlando.

3003. Curl, A. L., and Bailey, G. F.
The carotenoids of Ruby Red grapefruit.
Food Res., 1957, **22**: 63-8, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2475.

The carotenoid pigments of the peel and pulp of Ruby Red grapefruit were separated by countercurrent distribution, and further fractionated by chromatography. The 2 principal pigments of the pulp were found to be lycopene and β-carotene, with smaller amounts of phytofluene, thus confirming earlier work; phytoene was a major constituent of the pulp and was the principal constituent of the peel, with phytofluene next in importance. In both peel and pulp carotenoids the majority of the pigments were hydrocarbons, but small monol and diol (plus polyol) fractions were also present, more in the peel than in the pulp carotenoids. Chromatography of these monol and diol fractions revealed about 13 constituents in both pulp and peel carotenoids. Most, if not all, of the xanthophylls found in oranges [see *H.A.*, 26: 3097] and in tangerines [see *H.A.*, 27: 3871] were present in grapefruit as minor constituents, including "hydroxy-α-carotene", cryptoxanthin, a cryptoflavin-like fraction (peel only), a rubixanthin-like fraction, lutein, antheraxanthin (pulp only), luteoxanthins, mutatoxanthins, valenciachromes and auroxanthins.

Dates.

(*See also* 2059, 3026v, 3027c, i.)

3004. Smirnoff, W.
La cochenille du palmier dattier (*Parlatoria blanchardi* Targ.) en Afrique du Nord. Comportement, importance économique, prédateurs et lutte biologique. **(The date palm scale insect in North Africa: its behaviour, economic importance, predators and biological control.)** [English summary 1½ p.]
Thése Fac. Sci. Univ. Paris, 1957, pp. 98, bibl. 65, illus.

Detailed studies on *Parlatoria blanchardi*, carried out in Morocco since 1951, are reported. Chemical control is impracticable, but biological control, using 14 predacious species, has given promising results.

3005. Rinderknecht, H., and Jurd, L.
A novel non-enzymic browning reaction.
Nature, 1958, **181**: 1268-9, bibl. 6.

In ripening dates there is a simultaneous development of colour and disappearance of polyphenols. Chemical tests showed that the browning was non-enzymatic and was due to the reaction of phloroglucinol with glycine. Other phenols, even those containing a combined phloroglucinol nucleus, did not react with glycine in the same way, indicating that the 3 hydroxyls of phloroglucinol must be free for reaction to occur.—Fruit Veg. Chem. Lab., U.S.D.A., Pasadena.

Litchis.

(*See also* 3027h, t.)

3006. Butcher, F. G.
Bees pollinate lychee blooms.
Proc. Fla Lychee Grs' Ass., 1956, **3**: 59-60, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 6147.

7-ft. litchi tree, enclosed 2 weeks before flowering in 16-mesh screen, flowered profusely but only set fruit. Neighbouring trees, freely visited by bees, t an average of 99 fruits per tree. This result indites the need for insect pollination and for avoiding secticide applications to litchis during the blossoming riod.—Univ. Miami, Coral Gables.

07. Butcher, F. G.
Pollinating insects on lychee blossoms.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 326-8, bibl. 5.

portant pollinators were the screw-worm fly *allitroga macellaria*), honey bees and the soldier etle (*Chauliognathus marginatus*).—Univ. Miami, oral Gables.

08. Mustard, M. J., Nelson, R. O., and Goldweber, S.
Exploratory study dealing with the effect of growth regulators and other factors on the fruit production of the lychees.
Proc. Fla Lychee Grs' Ass., 1956, **3**: 33-8, from *Biol. Abstr.*, 1958, **32**, Abstr. 6155.

dium NAA at 100 p.p.m., NAA at 0·003% and DNO nitro-o-cyclo-hexylphenol) at 0·06% were applied sprays to young Brewster litchi trees in 4 successive tumns. In one season solutions of B at 125 p.p.m. nd of sucrose at 15%, alone and in combination, were so applied to the trees when the female flowers were en. None of the treatments materially affected the getative condition of the trees or their fruit yields.—niv. Miami, Coral Gables.

09. Das, C. S., and Choudhury, K. R.
Malformation of litchi *Litchi chinensis* flowers and its control.
Sci. and Cult., 1958, **23**: 426-7, bibl. 6, illus.

aused by a mite, *Eriophyes* sp., this trouble was conlled by pruning affected shoots and spraying with 4% DDT in winter.—Hort. Res. Stat., Krishnagar.

10. Dennison, R. A., and Hall, C. B.
Studies on the handling of fresh lychees.
Proc. Fla Lychee Grs' Ass., 1956, **3**: 31-3, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 1648.

ruits were separated into their various specific avities. The lower the specific gravity of the fruits, smaller the size of the seeds and the higher the rcentage of flesh. Fruits stored at 70° F. lost less eight than those stored at a lower and a higher temrature.—Univ. Fla, Gainesville.

11. Mukerjee, P. K.
Dehydration of litchis.
Hort. Advance, 1957, **1**: 55-7, bibl. 3.

reliminary experiments suggest that a continuous, ectrically heated, air blast would be the best method of ehydrating litchis. The dried fruit contained more gars, on a dry weight basis, than fresh fruit.

Macadamias.

See 3026m, 3027p.

Olives.

(*See also* 3026 l, 3027d, f, g, o.)

3012. Natividade, J. V.
Juvenilidade na *Olea europaea* L. (**Juvenility in *Olea europaea*.** [English summary ½ p.]
Agron. lusit., 1957, **19**: 145-59, bibl. 39, illus.

Wild olives in rocky habitats remained extremely dwarfed, with densely massed juvenile foliage, for more than 50 years, owing to continuous browsing of sheep and goats. When later protected from animals they produced vigorous normal shoots bearing at first transitional and soon afterwards typical adult leaves.

3013. Hartmann, H. T., and Porlingis, I.
Effect of different amounts of winter chilling on fruitfulness of several olive varieties.
Bot. Gaz., 1957, **119**: 102-4, bibl. 3.
Fruitfulness in the olive.
Calif. Agric., 1958, **12**(5): 6, 11.

Inflorescence and subsequent fruit production in 8 olive varieties was, in general, directly proportional to the amount of winter chilling received. Trees of each variety maintained in a warm greenhouse throughout the winter failed to produce a single inflorescence. The number of flowers per inflorescence or the percentage of perfect flowers produced was not affected by the amount of winter chilling. The varieties Ascolano and Sevillano required the maximum amount of winter chilling encountered at Davis, California, during each of two winters, before appreciable amounts of inflorescences were produced. The varieties Mission, Criolla, Barouni, and Manzanillo produced some inflorescences with intermediate amounts of chilling, although considerably more development occurred with the full amount of chilling. In the 1956–57 tests the Rubra and Azapa varieties were able to produce substantial numbers of inflorescences under the minimum amount of chilling given, indicating that they might be adaptable to regions of relatively high winter temperatures. [From authors' summary.]—Univ. Calif., Davis, U.S.A., and Univ. Thessalonika, Greece.

3014. Noro, K.
Effects of soil reaction and nutrient elements on the growth of the olive. II. Effects of calcium, magnesium and potassium on the growth of the olive tree. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1956, **8**: 91-9, bibl. 25, [received 1958].

Low soil contents of Ca and Mg and a soil pH of 4·0–4·5 were associated with a leaf chlorosis, reddish-yellow veins and tip necrosis. In both soil and leaves Ca and Mg were positively correlated. In the leaves of trees showing deficiency Ca ranged from 0·160 to 0·290% and Mg from 0·022 to 0·052% of dry weight, whereas healthy trees from the Mediterranean area are reported to contain about 10 times these amounts.

3015. NORO, K.
Effects of soil reaction and nutrients on the growth of the olive. III. Preliminary report on the relationship between the soil reaction and nutrient elements, with special reference to the effect of calcium on the growth of the olive tree. [Japanese, with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1957, **8**: 148-56, bibl. 26, illus.

Six nutrient solutions (full nutrient solution, minus K, minus Mg, and Ca at levels of 0, 1 and 2) were applied to potted 2-year-old Mission olive trees grown in sand culture at 2 pH ranges. In the cultures lacking K and Mg growth ceased before characteristic leaf symptoms developed. The symptoms of K and Mg deficiencies, which appeared after 4 months, resembled those reported from California [see *H.A.*, 24:821]. In Ca-deficient plants the leaves became very small and broad and this was followed by growth cessation, leaf necrosis and defoliation. The greatest growth was made by the plants receiving double Ca despite the low pH of the sand (pH 4·0–4·5); the minus-K plants came next and the full-nutrient plants third.

3016. NAITO, N., AND TANI, T.
Antibiotic production induced by 2,4,5-T and MCP in *Gloeosporium olivarum* causing olive anthracnose. [English, with Japanese summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1957, **8**: 157-67, bibl. 16.

Gloeosporium olivarum grown on media containing 0·006% 2,4,5-T and 0·015% MCPA produced antibiotic substances. NAA did not induce antibiotic production, and it is suggested that the property is specific to 2,4-D and related compounds. It is concluded that the inhibitory effect of MCPA on the growth of the pathogen *in vitro* is due mainly to the antibiotic rather than to a direct effect of MCPA on the fungus. [See also *H.A.*, 27: 1355.]

3017. AVIDOV, Z., MOORE, I., AND HARPAZ, I.
Dieldrin versus diazinon in the control of the olive fruit fly (*Dacus oleae* Gmel.) in Israel.
Ktavim, 1958, **8**: 117-26, bibl. 6.

Diazinon at 0·08% active ingredient, applied when the oil content of olives was at least 6%, effectively controlled the olive fly in a season when the harvest was unusually early. One or two applications of dieldrin 0·2% active ingredient effectively controlled the fly on the early variety Merkhaviah, but 2 applications were followed by a marked increase in honey-dew and sooty mould.

3018. PLANES, S., AND DEL RIVERO, J. M.
Algunos datos experimentales sobre la lucha contra la mosca del olivo con el método español de los mosqueros, pulverizaciones cebo y pulverización total de los árboles con insecticidas fosforados. **(Some experimental data on the control of olive fly by the Spanish method of trapping, baited sprays and spraying of whole trees with phosphoric insecticides.)**
Bol. Inst. nac. Invest. agron. Madrid, 1957, **17**: 363-73, bibl. 5, illus.

As a bait for mixing with insecticidal sprays used against *Dacus oleae*, a 1% solution of partially hydrolysed yeast protein was up to 20 times as effective as 5% sugar and had the further advantage of not attracting the sooty mould fungus *Antennaria elaeophila*. Each tree was sprayed on the south side with 250 c.c. of mixture and the flies were collected in a large trap placed below. In an experiment comparing unbaited insecticides sprayed over the whole crowns of trees a 0·2% solution of 5·0%-active chlorthion emulsion gave the best results and a 0·2% solution of 20%-active diazinon was only slightly less effective.

3019. MIJUŠKOVIĆ, M., AND MIRČETIĆ, S.
Mogućnost suzbijanja maslinove mušice parationskim sredstvima. **(The possibility of controlling olive fly by parathion.)** [French summary 1 p.]
Zasht. Bilja, 1957, No. 39/40, pp. 23-42, bibl. 13.

Experimental work on the control of *Dacus oleae* with parathion (E-605 forte) on the Montenegran coast during 1954–1956 has shown that: (1) Phosphoric ester compounds are effective against the olive fly under certain conditions. (2) The pupae are resistant but the larvae susceptible. (3) Treatment with 0·05% active material is effective, but 0·075–0·1% has better residual action. When the attack is early and severe 2 applications are required, the first when the insects are in flight and the second 20 days later. (4) Following an effective treatment in 1956 the oil of the most important variety Žutica contained 1 p.p.m. parathion. (5) Toxicological studies will have to be carried out before the general use of parathion can be recommended. [See also *H.A.*, 27: 830.]

3020. ANTONGIOVANNI, E.
Impiego del Rogor contro la generazione antofaga della tignola dell'olivo. **(Use of Rogor for control of the anther-eating generation of the olive moth.)**
Lotta contro la generazione carpofaga della tignola dell'olivo a mezzo del Rogor. **(Control of the fruit-eating generation of the olive moth by Rogor.)**
Reprinted from *Olivicoltura*, 1957, Vol. **12**, Nos. 1 and 4, pp. 8, bibl. 1, and pp. 7, bibl. 3.

Rogor L, containing 20% of 0,0-dimethyldithiophosphorylacetic N-monomethylamide, was sprayed at 0·2% and 0·3% normal volume or at 2% and 3% low volume on olive trees with fully formed, but unopened, flower buds. A similar preparation containing 10% of the active substance was sprayed at twice the above concentration and Rogor P (powder containing 3% of the active substance) was dusted on some trees. All these treatments gave nearly complete control of the anther-eating generation of *Prays oleellus* and good protection from invasion by the adults from neighbouring untreated trees. Lead arsenate at 0·5% or 5% (according to volume) was practically useless, being readily washed from the trees by rain. In a second experiment Rogor L at 0·3% sprayed during oviposition by adults of the anther-eating generation gave complete control of fruit-eating larvae in olives surviving the summer drop and also reduced autumn drop from 13·1% to 0·9%.

21. SANDRET, F. G.
La maturation de la pulpe d'olive. Les substances glucidiques solubles et leur évolution. (**The ripening of olive pulp. The soluble carbohydrates and their evolution.**)
Oléagineux, 1958, **13**: 459-64, bibl. 23.

udies of 3 Moroccan varieties showed that the main gars in olive pulp are glucose, fructose and sucrose, e latter being absent from over-ripe fruit. The lative quantities of the different sugars are fairly nstant, viz. the fructose/reducing sugars ratio= 40 to 0·45 and the reducing sugars/total soluble sugars tio=0·70–0·85, increasing towards 1 in over-ripe fruit. the early stage of ripening the sugar content of the lp increases, and later generally decreases. In ripe over-ripe olives small quantities of xylose, galactose, annose and decomposition products of hemicelluloses e present. Olive pulp always contains some mannil, which is particularly abundant in green olives, t decreases with ripening. Free glycerol is present hen ripening is complete.

Passion fruit.

See 3026y.

Persimmons.

22. NIRVAN, R. S.
Control of dry rot of persimmon (*Diospyros kaki* Linn.) seeds.
Hort. Advance, 1957, **1**: 62-4, illus.

eatment of persimmon seeds with Agrosan at oz./1 cwt. seeds effectively controlled *Penicillium* sp. fection, which greatly reduced germination in the rsery. Ceresan was less effective.

23. TARUTANI, T., AND MANABE, M.
Studies on the utilization of persimmons (*Diospyros kaki* Linn.). I. Experiments on the removal of astringency and fruit storage in vinyl bags. [Japanese, with English summary ¾ p.]
Tech. Bull. Kagawa agric. Coll., 1957, **8**: 233-9, bibl. 18, illus.

Astringency in persimmons stored at room temperature n vinyl bags disappeared after 3–4 days when the nitial CO_2 content in the bags was 78%. Astringency n control fruits stored in bags containing air did not isappear for 17–19 days. In the various gas storage reatments concentrations of O_2 and CO_2 gas changed apidly at first but became constant after 10 days. ruit contents of ethyl alcohol and acetaldehyde ncreased rapidly at first in storage; total sugar and cid contents decreased gradually during storage. The longer periods of gas storage induced a physioogical breakdown in the tissue.

Tung.

(*See also* 3027k.)

3024. GILBERT, S. G., AND SELL, H. M.
Biochemical changes during germination of the tung seed.
Plant Physiol., 1957, **32**: 668-74, bibl. 8.

The changes in chemical composition, respiratory gas exchange, and enzymatic activities were followed hrough the germination of dry-stored and stratified tung seeds. The stratified seeds germinated more rapidly and uniformly than did the dry seeds. This effect of treatment was associated with the earlier absorption of water and activation of the enzymes lipase and amylase in the stratified seeds. The higher enzyme activity in turn was reflected in a more efficient utilization of oil reserves, as indicated by a more rapid drop in RQ values following planting and by the absence of free fatty acids in either the endosperm or the embryo oil of the stratified seeds until the seedlings had reached the stage preceding dissolution of the endosperm. As soon as the dry-stored seeds sprouted, free fatty acids were found, and the quantity increased rapidly as germination proceeded. The formation of saturated intermediates during the process of oil utilization was evident earlier in the oils of dry-stored seeds than in those of the more efficient stratified seeds. One end product of oil utilization was starch, which increased rapidly in the developing seedling while the oil of the endosperm decreased at a corresponding rate. At all stages of germination, irrespective of treatment, the embryo oil had a lower percentage of unsaturated glycerides than the endosperm oil. This indicates that the fatty acid radicals remain essentially unchanged in molecular weight prior to utilization with no detectable accumulation of lower molecular weight intermediates during their utilization. [Authors' summary.]

Sundry crops.

(*See also* 3026c.)

3025. WATANABE, —., AOBA, —., AND ABE, —.
Study of fruit set in *Asimina triloba*. 1. Observation concerning pollination and fertilization. [Japanese, with English summary.]
Bull. Yamagata Univ. (*agric. Sci.*), 1956, **2**(2): 53-62, from *Ref. Ž.* (*Biol.*), 1957, No. 17, Abstr. 73,881.

Flower bud differentiation in *A. triloba* begins in June and by the middle of July the formation of all flower organs is completed. Pollen grains germinated better on sugar than on agar-agar. *A. triloba* proved to be partially self-sterile, and the best fruit set was obtained from cross-pollination.

Noted.

3026.

a ABRAMS, R., AND OTHERS.
Flower behavior of different avocado varieties grown in Puerto Rico. [Spanish summary ⅓ p.]
J. Agric. Univ. P.R., 1957, **41**: 236-41, bibl. 3, illus.
Lists of A and B types among 118 varieties.

b ANON.
Gopher control.
West. Fruit Gr, 1958, **12**(4): C12-13, illus.
Instructions on trapping in citrus orchards.

c ANON.
Use clovers and medics in orchards under sprinklers.
J. Dep. Agric. S. Aust., 1958, **61**: 338-9, 344, illus.
For citrus in S. Australia.

d BAGHDADI, H. A., AND MINESSY, F. A.
Effect of different rootstocks on growth of six citrus varieties at time of transplanting.
Alexandria J. agric. Res., 1957, **5**(2): 3-12, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,486.

e BAGHDADI, H. A., AND MINESSY, F. A.
Growth characteristics of new citrus rootstocks compared with rootstocks already tried in Egypt.
Alexandria J. agric. Res., 1957, **5**(1): 79-88, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 100,945.
Effects on various citrus varieties compared with those of sour orange.

f BAGHDADI, H. A., AND NASR, T. A.
Effects of girdling and leaf area, in some citrus species, on setting of flowers and the development of fruits.
Alexandria J. agric. Res., 1957, **5**(2): 123-42, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,487.
Ringing increased fruit setting on Navel and Valencia oranges, but not on Duncan grapefruit or Eureka lemons.

g BAGHDADI, H. A., AND NASR, T. A.
Relation of flowering habits to fruit setting in some citrus species.
Alexandria J. agric. Res., 1957, **5**(1): 67-77, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 100,946.
Rate of fruit set in relation to time of flowering.

h BENK, E., AND KREHL, S.
Zum Nachweis von Diphenyl und o-Oxydiphenyl auf Zitrusfrüchten. **(The detection of diphenyl and o-phenylphenol on citrus fruits.)** [English summary.]
Fruchtsaft-Ind., 1957, **2**: 86-9, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2533.
Colorimetric methods.

i BERGH, B. O.
Avocado breeding in California.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 284-90, bibl. 21, illus.
Aims and progress reviewed.

j BIOLOGICAL BRANCH, N.S.W. DEPARTMENT AGRICULTURE.
Armillaria root rot of fruit trees.
Agric. Gaz. N.S.W., 1958, **69**: 87-90, illus.
And its control, with particular reference to citrus.

k BITTERS, W. P.
Citrus for ornamental planting in California.
Lasca Leaves, 1957, **7**: 29-44, bibl. 12, illus.

l BULL, M. R.
Olives in Spain.
World Crops, 1958, **10**: 177-9, illus.
A short general account.

m EASTWOOD, H. W., AND KEBBY, R. G.
The macadamia nut.
Agric. Gaz. N.S.W., 1958, **69**: 69-75, 92, illus.
Notes on seed selection, culture and yields.

n EL-AZZOUNI, M. M., AND WALI, Y.
Studies on the root distribution of some citrus rootstocks budded to Washington Navel.
Ann. agric. Sci., Cairo, 1956, **1**(1): 219 42, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,484.

o FEDER, W. A., AND FORD, H. W.
Susceptibility of certain citrus varieties, species, and relatives to the burrowing nematode.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 60-3, bibl. 2.

p FISHER, F. E.
Maneb-oil injury to grapefruit.
Plant Dis. Reptr, 1958, **42**: 266-7, bibl. 3, illus.
Maneb is not recommended at present for use on citrus.

q FLANDERS, S. E., AND GRESSITT, J. L.
The natural control of California red scale in China.
Bull. Calif. Dep. Agric., 1958, **47**(1): 23-33, bibl. 20, illus.
Parasites and predators of *Aonidiella aurantii*.

r FORD, H. W., AND HANNON, C. I.
The burrowing nematode, *Radopholus similis*, in roots of *Crotalaria spectabilis*.
Plant Dis. Reptr, 1958, **42**: 461-3, bibl. 9.
The use of *C. spectabilis* as a non-host cover crop for citrus is questioned.

s FROST, H. B., CAMERON, J. W., AND SOOST, R. K.
Diversity among nucellar-seedling lines of Satsuma mandarin and differences from the parental old line.
Hilgardia, 1957, **27**: 201-22, bibl. 13, illus.
The full account of the studies outlined in *H.A.*, 27: 1799.

t GARCÍA ALVAREZ, R., AND OTHERS.
Variaciones en la composición de las naranjas españolas a lo largo de la temporada 1955–56: contenido en zumo, extracto refractométrico, acidez, índice de madurez y vitamina C. **(Variations in composition of Spanish oranges over the period 1955-56: juice content, refractimetric extract, acidity, maturity index and vitamin C.**
Bol. Inst. nac. Invest. agron. Madrid, 1957, **17**: 239-67, bibl. 7.
Data are presented for 8 varieties from 6 districts.

u GOODALL, G. E., AND BITTERS, W. P.
Lemon fruit quality study in Santa Barbara Co.
Calif. Citrogr., 1958, **43**: 192, 209-10.
Including comparisons between several old-line and nucellar strains of Eurekas and Lisbons.

v de Halperín, D. R., de Pastoriza, A. E. de E., and Atlas, E.
Vino y vinagre de dátiles preparados con fruta de descarte. **(Wine and vinegar prepared from non-marketable dates.)**
Idia, 1957, No. 118, pp. 1-18, bibl. 32.
Good quality vinegar, but poor quality wine, was produced.

w Hatton, T. T., Jr., and others.
Relation of maturity to certain chemical and physical characters in Florida avocados.
Proc. Fla St. hort. Soc., 1957, **70**: 338-40, bibl. 11.
Results confirm current Florida regulations for maturity.

x Hirst, H., and Panaretos, A.
The citrus industry in Cyprus.
World Crops, 1958, **10**: 180-2, illus.
A short description, with figures of production and trade.

y Jaramillo J., A.
Anotaciones sobre el cultivo de la curuba. **(Notes on cultivation of *Passiflora* spp.)**
Agric. trop. Bogotá, 1957, **13**: 607-10, illus.
An extension of the article noted in *H.A.*, 28: 822p.

z Jones, W. W., Cree, C. B., and Embleton, T. W.
Effect of nontillage of Navels.
Calif. Agric., 1958, **12**(3): 5, 10.
See *H.A.*, 28: 778.

27.

a Knorr, L. C., and Childs, J. F. L.
Occurrence of wood pocket (blotch), chimeric breakdown, and endoxerosis in Florida, with particular reference to the Tahiti lime.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 75-81, bibl. 6, illus., and *Citrus Ind.*, 1958, **39**(6): 10-11, 13-15, 19, bibl. 6, illus.
Two types of mutation described that make budwood selection desirable.

b Levitt, E. C.
Planting of citrus trees.
Agric. Gaz. N.S.W., 1958, **69**: 14-17, illus.
Advice on preparation, planting and after care.

c Meier, H.
On the structure of cell walls and cell wall mannans from ivory nuts and from dates.
Biochim. biophys. Acta, 1958, **28**: 229-40, bibl. 15, illus.
Submicroscopic studies on mannans of endosperm cell walls and their carbohydrate composition.

d Mesa Bernal, D., and Valenzuela Samper, G.
Breve reseña historica sobre el cultivo del olivo en Colombia. **(Short historical summary of olive cultivation in Colombia.)**
Agric. trop. Bogotá, 1957, **13**: 629-34.

e Minessy, F. A., and Higazy, M. K.
Polyembryony in different citrus varieties in Egypt.
Alexandria J. agric. Res., 1957, **5**(1): 89-96, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 100,949.
In different species and varieties on various rootstocks in various localities.

f de Mira Galvão, J. M.
A queima das oliveiras. Prejuizos causados às oliveiras pelas baixas temperaturas e como remediá-los. **(Frost injury to olive trees. Injuries to olive trees caused by low temperatures and how to remedy them.)**
Folha Divulg. Dir. ger. Serv. agríc. Beja, **49**, 1956, pp. 8, illus.
By cutting back, pruning, bordeaux spraying and painting with iron sulphate.

g Mount, W. E.
Olive growing as a commercial venture.
J. Dep. Agric. S. Aust., 1958, **61**: 385-7, 389, illus.
Small profits and slow returns, but the industry is expanding.

h Mustard, M. J., and Lynch, S. J.
A comparison of the percentage pulp, seed and skin of the lychees grown in different parts of Florida. II.
Proc. Fla Lychee Grs' Ass., 1956, **3**: 53-4, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 6156.
Comparisons on the variety Brewster, with note on new variety Peerless.

i Nada, I. A. A.
The effect of the initial concentration of sugars in date fruits on the rate of their softening.
Ann. agric. Sci., Cairo, 1956, **1**(1): 5-8, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,470.
A minimum concentration of sugars of about 15% is essential for successful softening.

j New South Wales Department of Agriculture, Biological Branch.
Psorosis, or scalybark of citrus.
Agric. Gaz. N.S.W., 1958, **69**: 90-2, illus.
Symptoms and use of certified budwood.

k Potter, G. F., and Crane, H. L.
Tung production.
Fmrs' Bull. U.S. Dep. Agric. **2031**, 1957, pp. 34, illus.
Detailed cultural instructions, mainly for southern U.S. but useful elsewhere.

l Robinson, P. W.
Some avocado varieties for the far north coast.
Banana Bull., 1958, **22**(3): 8.
Notes on Fuerte, Dickinson, Queen, Eastwood, Anaheim and Pankey in N.S.W.

m RODRÍGUEZ, R. A.
Gomosis o podredumbre del pie del naranjo. **(Gummosis or foot rot of orange trees.)**
Suelo Tico, 1958, **10**(38): 13-16, bibl. 6.
Symptoms, organisms, prevention and cure in Costa Rica.

n ROMANI, R. J., AND BIALE, J. B.
Metabolic processes in cytoplasmic particles of the avocado fruit. IV. Ripening and the supernatant fraction.
Plant Physiol., 1957, **32**: 662-8, bibl. 19.
Oxidative and phosphorylative activities in relation to ripening and senescence.

o SOLIMAN, A. A.
On the control of the olive-tree scale, *Leucaspis riccae* Targ., at Burg El-Arab, Egypt.
Bull. Soc. ent. Egypte, 1956, **40**: 207-15, from *Bull. sci. tech. Docum. Centre, Cairo*, 1956, Vol. **2**, Abstr. 101,611.
By 2–3 applications of 0·04% parathion at time of emergence of crawlers.

p STOREY, W. B.
The macadamia in California.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 333-8, bibl. 11.
Botany, history, adaptation, propagation, varieties.

q TARJAN, A. C.
Spray materials for decontaminating nematode-infested grove equipment.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 85-90, bibl. 2, illus.
1% caprylic acid, 2·6% sodium hypochlorite or water against *Radopholus similis*.

r TAYLOR, O. C., CAHOON, G. A., AND STOLZY, L. H.
Splitting of Navel oranges.
Calif. Agric., 1958, **12**(3): 6, 10.
See *H.A.*, 28: 775.

s VENKATAKRISHNIAH, N. S.
Canker disease of sour lime and its control.
Lal-Baugh, 1957, **2**(2/3): 40-4, illus.
Agrimycin-100 gave promising results against *Xanthomonas citri*.

t WARE, C. E.
Peerless, an interesting new lychee.
Proc. Fla Lychee Grs' Ass., 1956, **3**: 60-2, from *Biol. Abstr., Sect. D*, 1958, **32**, Abstr. 6160.
Description of prolific large-fruited variety.

u YEE, W.
Producing avocado in Hawaii.
Ext. Circ. Univ. Hawaii **382**, 1957, pp. 16, bibl. 15.
Including varieties, propagation methods, pests and diseases.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

See 2095, 2427-2429, 3176h, 3177j, 3186, 3211, 3212, 3217, 3218, 3223, 3226 l, m.

Bananas.

(*See also* 2150, 2511b, 3176k, 3177b, k, 3178j.)

3028. JAMAICA BANANA BOARD.
Annual Report of the Banana Board Research Department, Jamaica, 1956-1957, 1958, pp. 22.

This is the first report of the Research Department and covers the period October, 1955, to March, 1957. Investigational work in progress includes: *Crop Physiologist:* fertilizer trials, a sucker pruning experiment, and studies of openhandedness and of premature yellowing. *Soil Chemist* and *Agronomist:* fertilizer investigations. *Plant Pathologist:* leaf-spot control using bordeaux plus Triton X-114, oil spraying with and without copper, helicopter spraying trials, diseases of shipped fruit and studies of washing, packing and handling damage.

3029. MERLE, P., CUILLÉ, J., AND DE LAROUSSILHE, F.
Une campagne de lutte contre *Cercospora* au Cameroun. **(A campaign against *Cercospora* in the French Cameroons.**
Fruits d'Outre Mer, 1958, **13**: 143-58, illus.

A description is given of the organization and the results obtained in protecting 15,000–20,000 ha. of bananas against leaf-spot disease with low-volume oil and copper sprays, applied mainly from the air by both conventional aircraft and helicopters.—Stat. régionale Cult. fruit. Cameroun.

3030. BRUN, J.
Étude sur l'action des fongicides huileux dans la lutte contre la cercosporiose. Note préliminaire. **(A study on the action of oil fungicides in the control of cercospora leaf spot. Preliminary note.)**
Fruits d'Outre Mer, 1958, **13**: 3-14, illus.

Experiments using commercial oil and oil plus copper oxychloride to control banana leaf spot showed that treatment with oil alone was practically as effective as oil+copper. The mixture was, however, superior during sporulation. Provided perfect leaf coverage was obtained control was complete, both for preventing infection and for stopping the development of an existing outbreak.—Stat. centr. Cult. fruit. trop., Antilles franç.

3031. CUILLÉ, J., AND BLANCHET, B.
Les huiles de traitements, leur phytotoxicité. **(Spray oils, their phytotoxicity.)**
Fruits d'Outre Mer, 1958, **13**: 53-65, bibl. 11, illus.

The products of crude oil distillation are described and the nature of the phytotoxic damage caused by them is considered. With the use of low volume oil sprays for the control of leaf spot of bananas in mind, the characteristics which make an oil suitable for the purpose are outlined.

3032. Guyot, H., and Cuillé, J.
Essai de prévision des attaques de *Cercospora* en Guadeloupe. **(Experimental forecasting of outbreaks of *Cercospora* in Guadeloupe.)**
Fruits d'Outre Mer, 1958, **13**: 85-94, bibl. 12, illus.

The development of *Cercospora* lesions on 4 banana leaves selected each week at each of 15 plantations in Guadeloupe was recorded for 2 years and compared with records of temperature and relative humidity. In this way the microclimatic conditions necessary for the growth of *Cercospora* on bananas were determined, and this information has provided a guide as to the best times to apply low-volume mineral oil sprays.

3033. Magee, C. J.
The effect of oil in controlling banana leaf spot.
Commonw. phytopath. News, 1958, **4**: 10.

The effect may be that of retarding senescence in the leaves rather than fungistatic. Other examples of oil aiding fungicidal action, for example against black spot and *Septoria* spot of citrus, may also be due to its conditioning effect on the fruit.

3034. Stover, R. H.
Studies on *Fusarium* wilt of bananas. II. Some factors influencing survival and saprophytic multiplication of *F. oxysporum* f. *cubense* in soil.
Canad. J. Bot., 1958, **36**: 311-24, bibl. 35.

The investigations described showed, among other things, that multiplication of *Fusarium oxysporum* f. *cubense* is greater in soil previously flood fallowed and in soil subject to anaerobiosis than in soil not flood fallowed.—United Fruit Co., La Lima, Honduras.

3035. Sequeira, L.
Bacterial wilt of bananas: dissemination of the pathogen and control of the disease.
Phytopathology, 1958, **48**: 64-9, bibl. 24, illus.

The bacterial wilt of bananas caused by *Pseudomonas solanacearum*, commonly known as Moko disease, is spread rapidly through banana cultivations by the use of infested tools in various cultural operations. Infested soil in contact with fresh pruning wounds or other wounds is also an important means of dissemination. The enforcement of a tool-disinfestation program gave almost complete control of the disease in experimental plots. Infested banana areas can be reclaimed successfully by a combination of disking 5 times during the dry season and fallowing for 9 months before replanting. Apparently, the wilt organism is highly susceptible to desiccation. The application of bactericidal chemicals, such as formaldehyde, D-D, ammonium thiocyanate, hydroxymercurichlorophenol, mercuric bichloride, mercury pentanedione, phenol, potassium permanganate, ferrous sulphate, paraformaldehyde, calcium chloride or potassium chloride, and of heavy concentrations of fertilizers, such as urea and calcium cyanamide, was ineffective in eliminating the wilt organism from the soil. [From author's summary.]—United Fruit Co., Coto Stat., Golfito, Costa Rica.

3036. Braithwaite, B. M.
Ground spray treatment for control of banana beetle borer (*Cosmopolites sordidus* Germ.).
J. Aust. Inst. agric. Sci., 1958, **24**: 27-34, bibl. 5, illus.
Control of the beetle borer.
Banana Bull., 1958, **22**(3): 6.

A 0·1% aldrin ground and butt spray, using 2 lb. active ingredient per acre, gave effective control, and a 0·05% dieldrin spray, using 1 lb. a.i. per acre, was second best. The orthodox poison (BHC) baiting control method was ineffective. Single aldrin and dieldrin treatments were still effective 10 months later. The second article gives practical recommendations on the use of these insecticides.—N.S.W. Dep. Agric.

3037. Beccari, F.
I risultati di una missione in Somalia per lo studio dei problemi connessi alle infestazioni coccidiche sul banano. **(Results of a mission to Italian Somaliland to study problems connected with coccid infestation of bananas.)**
Riv. Agric. subtrop. trop., 1958, **52**: 12-49, bibl. 82, illus.

In Italian Somaliland the scale pest *Aspidiotus destructor* has spread to bananas from coconut palms. Conclusions reached as a result of extensive laboratory and field experiments led to the following recommendations: (1) the introduction of the predator *Cryptognatha nodiceps*; (2) the immersion of planting material in 0·3% OMPA [schradan]; (3) the spraying of plantations twice a year with a 0·5% emulsion of mineral oil containing 20% of parathion, using a fine spray. Fumigation with cyanide gas proved less satisfactory.

3038. Asenjo, C. F., and Porrata, E. I.
The carotene content of green and ripe plantains. [Spanish summary 7 lines.]
J. Agric. Univ. P.R., 1956, **40**: 152-6, bibl. 14, [omitted in error from *H.A.*, Vol. 27].

The average carotene content of 33 samples of green plantains was 10·43±3·66 μg./g., and that of 33 samples of ripe, yellow plantains was 6·68±2·97 μg./g.

Cacao.

(*See also* 3176v, 3178a.)

3039. Cocoa, Chocolate and Confectionery Alliance.
Cocoa Conference, 1957.
Cocoa, Choc. Confect. Alliance, 11 Green Street, London, W.1, pp. 326, bibls, illus., 3 guineas.

The 1957 Conference was larger and more comprehensive than any of its predecessors, the last of which was held in 1955 [see *H.A.*, 26: 2162]. In addition to addresses on various aspects of the industry, some 36 scientific papers were presented and the text of these plus the subsequent discussions is fully reproduced in this publication. Separate abstracts of some of these papers appear below, and in addition the following may be mentioned under their session headings: *Commercial background:* The demand for cocoa, problems and prospects, by J. F. Blitz. *Developments in new cocoa-growing areas:* Cocoa in Malaya, by

E. F. Allen, R. Henderson and L. N. H. Larter. A progress report on cocoa development in Fiji, by C. Harvey and L. W. Harwood. *Planting materials and methods:* The performance of the introductions and hybrids in W.A.C.R.I. trials, by D. R. Glendinning. Further experience in Ghana with Amazonian cocoa and other varieties, by P. S. Hammond. A new method of vegetative propagation for cocoa, by B. F. Topper [see *H.A.*, 27: 1879]. Rooting cocoa cuttings under polythene, by A. D. McKelvie [see *H.A.*, 28: 844]. The pollination of cocoa flowers, by A. F. Posnette and H. M. Entwistle. *Disease and pest control:* Recent developments in the control of cocoa pests and diseases in Latin America by L. P. Oechsli. The distribution of virus diseases of cocoa in the Ivory Coast, and Observations on cocoa pod rots, both by R. Renaud. Note on insect pests of cocoa in the French Cameroons, by E. Lavabre. Notes on the progress of pest and disease control in Ghana, by P. S. Hammond. A further report on the control of black pod disease in the Western Region of Nigeria, by J. R. G. Hadland. The history and control of swollen shoot disease in Nigeria, by R. M. Lister and J. M. Thresh. *The chemistry of cocoa fermentation:* An appraisal of fundamental research on cocoa curing at the Colonial Microbiological Research Institute, by W. G. C. Forsyth. Polyphenols and quality in West African amelonado cocoa, by T. A. Rohan. Artificial drying of cocoa, by G. A. R. Wood. *The cocoa tree in its environment:* The cocoa tree in relation to its environment (discussing soils, water, nutrients and light), by R. G. Fennah and D. B. Murray. The mineral nutrition of cocoa (discussing optimum anion/cation composition), by M. V. Homès. The suitability of the forest soils of Ghana for cocoa production, by A. J. Crosbie. Detailed soil and land capability surveys for cocoa, by G. Havord. The use of shade at Lakolela plantations (with observations on soils, climatic conditions and shade tree species), by L. Poncin.

3040. FAO.
Cocoa statistics, 1958, Vol. **1**, No. 1, pp. 32. [English, French and Spanish.]
FAO, Rome, annual subscription $1.00 or 5s.

This is the first number of a quarterly statistical bulletin issued under a resolution of the FAO Cocoa Study Group. It covers production and trade in cacao beans, butter, powder and chocolate products for the main producing and importing countries. The information presented is mostly from 1951 up to, and including the greater part of, 1957.

3041. WEST AFRICAN COCOA RESEARCH INSTITUTE.
Annual Report of the West African Cocoa Research Institute, 1956-57, Tafo, 1958, pp. 90, 5s.

Progress reports are given on current investigations on the following subjects: *Virus research:* host range of cacao viruses, insect-transmission, classification and comparison of isolates, resistance and tolerance, mechanical transmission, chemotherapy. *Black-pod disease:* spraying and harvesting trials, cushion infection, effect of age and size of pod on susceptibility, strains of *P. palmivora* in Nigeria and Ghana, resistance and tolerance. *Mealybug studies:* effect of dieldrin on ant activity and of formicidal spraying on mealybugs. *Capsid studies:* insecticidal control, population studies. *Pollination studies. Establishment and maintenance trials:* establishment, spacing and arboricide experiments. *Plant breeding and selection:* progeny and introductions trials, variety trials. *Vegetative propagation:* rooting under polythene sheets. *Root studies: Physiology of fruiting:* factors influencing yield, frequency of harvesting, flower counting. *Soil fertility, shade and manurial requirements:* absorption and translocation of radioactive P, major nutrient effects. *Cocoa preparation and quality:* fermentation, effect of storage on purple bean count, enzymes. *Ibadan Substation. Virus research:* Nigerian isolates, effect on growth and yield, symptom expression in trees and coppice growth, availability of swollen-shoot virus to feeding mealybugs, control in Nigeria, coppicing experiments. *Capsid studies:* chemical control.

3042. BARTLEY, B. G. D.
Trinitario-Scavina hybrids: new prospects for cocoa improvement.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 36-40, bibl. 5.

In Trinidad hybrids between ICS clones and selections brought from the Amazon basin have, in their early years, shown marked precocity, high yields and resistance to witches' broom disease, but they have rather small beans.

3043. NICHOLS, R.
Propagation of cacao in plastic bags.
Nature, 1958, **181**: 580, bibl. 3.

In this new method of cacao propagation each cutting is placed in wet, leached sawdust laid in coconut fibre, which is then folded round the base of the cutting, and the whole is enclosed in a plastic bag with a measured amount of water added. The bags are suspended under a cloth shade in about 7% light intensity, and no further attention is required until rooting has occurred. About 80–90% rooting is obtained, and cuttings of the more vigorous clones are ready for planting 22 days from setting in the bags. They are transported to the field in the bags and planted under heavy shade with the roots still enclosed in the fibre. The bags are inverted over the planted cuttings for 4–5 days to reduce transpiration, and 2 banana leaves are arranged over each cutting to provide temporary shade. Establishment in the field is about 60–70% of the cuttings set in the bags. The advantages of this method include reduced labour charges, the possibility of using unskilled labour, low cost of installation, easy transport to the field and prevention of drying out.—Imp. Coll. trop. Agric., Trinidad.

3044. BURLE, L.
Note sur le bouturage sous plastique. (**A note on rooting cocoa cuttings under plastic.**) [French and English.]
Rep. Cocoa Conf. Lond. 1957, 1958, English pp. 52-5, French pp. 56-9, both bibl. 1, illus.

Successful methods are described in which plastic sheets are used to retain moisture around 4-leaf cuttings set, after quick-dip treatment with IBA, in a compost medium (4 parts sawdust to 1 part farmyard manure) that had been allowed to weather for 6 months. Several frames that could be easily constructed by small cacao farmers for supporting the plastic are illustrated. The results are given of 8 experiments with cuttings placed under both polythene and polyvinyl sheets. In each case half the cuttings were set in baskets and half in polythene bags, and in 6 out of the 8 trials the former produced a higher percentage of rooted plants.

3045. BRAUDEAU, J.
Travaux effectués par la Station du Cacaoyer de Nkoemvone pour la sélection et la multiplication de plantes sélectionnés. (**The selection and multiplication of clones at Nkoemvone.**) [French and English.]
Rep. Cocoa Conf. Lond. 1957, 1958, English pp. 59-61, French pp. 62-4.

Cacao propagation is being undertaken on a large scale in the French Cameroons using cuttings set in small Alkathene [polythene] pots in concrete and glass bins. The transparent pots enable the progress of rooting to be seen and facilitate successful planting out.

3046. VAN DER KNAAP, W. P.
Kerapatan-pohon dan djarak-tanaman pada kakao. (**Tree density and spacing in cacao.**) [English summary 14 lines.]
Menara Perkebunan,* 1958, **27**: 39-47, illus.

Growth and yields of cacao, with almost no shade, were compared at 3 spacings. Higher yields in the first 3 years of cropping were obtained from plants spaced at 4×2 m. than from plants spaced at 8×4×2 m. or at 5×4 m.

3047. VAN HIMME, M., AND PETIT, J.
Premiers résultats d'une expérience d'ombrage artificiel sur cacaoyers à Yangambi. (**First results of an experiment on artificial shade for cocoa trees at Yangambi.**) [English and French.]
Rep. Cocoa Conf. Lond. 1957 1958, English pp. 227-41, French pp. 242-56.

Young amelonado plants grown from fan cuttings were maintained under artificial shade admitting 5%, 25%, 50%, 75% and 100% of full light. Measurements to assess growth and vigour were taken for 2 years. During the first year 25% full light was optimal, but in the second year 50% to 75% full light was best. In the second year 5% was definitely harmful, but trees receiving 100% tended to adapt themselves and in some respects surpassed the tree under 25% light. The experiment continues.

3048. TOLLENAAR, D.
Zink als stimulans voor vruchtzetting bij cacao. (**Zinc for stimulating fruit set in cacao.**) [Indonesian and English summaries 11 and 7 lines respectively.]
Bergcultures, 1957, **26**: 621-3, bibl. 4, illus.

In an experiment on the Clementina estate, Equador, pod production was increased by 20% after dithane sprays had been applied to young cacao trees. No effect on *Phytophthora* infection was observed, and the response is attributed to zinc.

3049. LELLIS, W. T., AND PEIXOTO FILHO, O.
Comparisons between fungicides in the control of cocoa brown pod rot (black pot disease).
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 78-9, bibl. 2.

The results obtained 27 days after the treatments were applied showed no significant difference between Cupravit (with spreader sticker), Wettable Orthocide 50 (with and without spreader sticker), Copper Sandoz and bordeaux mixture. The Copper Sandoz showed the highest residual effect 66 days after treatment. [From authors' summary.]—Inst. Cacao Bahia.

3050. GRIMALDI, J.
État des recherches sur la pourriture brune des cabosses du cacaoyer au Cameroun. (**The present position of research on black pod disease of cocoa in the French Cameroons.**) [French and English.]
Rep. Cocoa Conf. Lond. 1957, 1958, English pp. 90-9, French pp. 100-4.

Since pods on the trunk account for 50% of the infected pods and the disease first infects low growing pods and then spreads upwards, the author recommends spraying only the pods on the trunk. This treatment is quicker, and in practice is therefore more effective, than overall spraying.

3051. TOLLENAAR, D.
***Phytophthora palmivora* of cocoa and its control.**
Neth. J. agric. Sci., 1958, **6**: 24-38, bibl. 44, illus.

Symptoms and factors affecting the incidence of *Phytophthora palmivora* are described and discussed. Both branch and leaf canopy treatments have been successfully applied with Kieken's automatic mist blowers. A form of cuprous oxide, Caocobre-Sandoz, has given good control when applied at 2½–3 kg. in 100–200 l. per hectare on cycles of 3–6 weeks.

3052. TAYLOR, D. J.
Pest control research at W.A.C.R.I.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 125-8.

For capsid control in cacao endrin proved the most effective compound tested, but aldrin was cheaper and also effective. Dieldrin treatment of the trunks practically eliminated mealybug-tending ants and this was followed by a great fall in the mealybug population.

3053. DONALD, R. G.
A capsid control experiment in the Western Region of Nigeria.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 119-24.

In an experiment to compare portable motor driven mist-blowers with pneumatic knapsack sprayers fitted with misting nozzles, using various patterns of application, BHC was applied from August to February at 2 oz. and 4 oz./acre at 4-weekly intervals and at 4 oz. at 8-weekly intervals by mist blower, and also at 4 oz./acre by knapsack sprayer at 4-weekly intervals from August to February, and in August and September only followed by spot treatment by spraying and by dusting. All treatments were considerably better than the control, but the least effective were those in which treatment was applied in August and September only. The 8-weekly spraying was also rather less effective than the 4-weekly spraying. Resulting from this experiment growers are advised to give 3 overall applications in August and September at 28-day intervals using either mist blower or knapsack sprayer followed by spot treatments where damage occurs until February.—W.A.C.R.I. Substat.

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* Formerly *Bergcultures*.

3054. Henderson, M.
A test of spray deposits on cacao foliage using a fluorescent tracer.
Malay. agric. J., 1957, **40**: 269-74, bibl. 1.

Zinc-8-hydroxyquinolate was used as a tracer and applied as a dry fog, a wet fog and as a mist spray. Fogging was largely ineffective, but mist spraying gave an effective, even deposit.

3055. Bridgland, L. A., and Friend, R. J.
Experiments and observations on cocoa fermentation in New Guinea.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 177-90, bibl. 7.

A method of fermentation is described in which the beans, after an initial sweating period of 16–20 hours, are spread out in the shade and rested for 24 hours before being returned to the box for further fermentation. A number of variations in this technique were also tested. In general, it resulted in the prevention of acetic acid formation in significant quantities, in ensuring the development of high temperatures and in the production of beans of good chocolate flavour.

3056. Howat, G. R.
Fermentation and drying—research in the field.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 190-202.

Investigations were carried out on the fermentation of amelonado cacao in Ghana over 3 seasons. Fermentation was done in heaps, in boxes holding 500 lb. and 2 tons, and in 2 specially designed stainless steel vessels equipped with drains, water jackets and heaters holding 500–600 lb. and 100 lb. respectively. The results of observations on temperature, pH of pulp and cotyledons, moisture and CO_2 production are given and discussed.

3057. Rohan, T. A.
Processing of raw cocoa. I. Small-scale fermentation.
J. Sci. Food Agric., 1958, **9**: 104-11, bibl. 10.
Observations on the fermentation of West African amelonado cocoa.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 203-7, bibl. 9.

The recommended fermentation technique for West African amelonado cacao was varied within wide limits to determine how critical are the instructions given to peasant farmers. It was found that quantities as small as 20 lb. of wet beans could be successfully fermented during the main-crop season (Sept.–Jan. in Ghana). Fermentation in heaps does not take place uniformly through the mass, there being a more rapid temperature rise and earlier death of beans at the surface. It is not known whether complete uniformity can be obtained even with mixing. Reduction in batch size is accompanied by a corresponding increase in uniformity. With very small batches the fermentation time could be reduced, and mixing had no noticeable effect on quality. The presence of purple beans in fermented and dried cacao is not considered necessarily deleterious, since prolonged fermentation, with the risk of loss of quality, is needed to obtain a completely brown product. In beans fermented for at least 4 days the anthocyanin concentration after drying was reduced to less than 5% of that initially present. The duration of fermentation should be related to batch size, and with small quantities, up to 250 lb. wet beans, the recommended 6 days is considered unnecessarily long. With large heaps longer fermentation may be required to increase uniformity. Qualitative chromatographic analysis has shown that West African amelonado contains 2 principal anthocyanins, 4 catechins and 3 *leuco*cyanidins. These compounds appear to be identical with those found in Trinidad ICS 1 material.
The second paper discusses certain practical implications arising from this work.—W.A.C.R.I.

3058. Quesnel, V. C.
Curing cocoa in the laboratory.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 150-5, bibl. 21.

A method of curing small quantities of beans, which does not depend on micro-organisms and which produces cured cocoa with full commercial flavour, is described. The beans, together with a few rubber bungs, are washed with water in a domestic clothes washing machine for about 2 hours. They are then rinsed and dried of excess water. 225 g. of beans are placed in a 1-lb. Kilner jar, and 225 ml. of a solution made up with distilled water to contain 1% V/V acetic acid and 1% V/V ethanol and warmed to 50°C. is poured over the beans. The jar is sealed and kept for 48 hours in an incubator thermostatically controlled at 45° C. The beans are then rinsed twice with tap water and spread out on the laboratory bench to dry. —Colon. microbiol. Res. Inst., Trinidad.

3059. Jacquemin, H.
Le cacao ardoisé. **(Slaty cocoa.)**
Café, Cacao, Thé, 1957, **1**: 134-5, bibl. 2.

In small-scale fermentations of cacao, the percentages of slaty and purple beans were in no way connected with the state of maturity of the pods, but depended solely on the temperature maximum. Below 45° C. both slaty and purple beans were still present after 6 days. Between 45 and 50° C. purple beans occurred in decreasing proportions and slaty beans were eliminated. A high quality product was obtained by maintaining the temperature between 30 and 40° C. for the first 3 days and at almost 50° C. for the remaining 5 days of fermentation. Beans fermented in an aerated thermos flask at 44° C. showed no slaty colouring. For practical purposes small vats can be made from very light wood such as *Ricinodendron* or *Bombax*. —Int. Ét. Rech. trop. Adiopodoume, Côte d'Ivoire.

3060. Forsyth, W. G. C., Quesnel, V. C., and Roberts, J. B.
The interaction of polyphenols and proteins during cacao curing.
J. Sci. Food Agric., 1958, **9**: 181-4, bibl. 14.

The solubility and activity of the glycosidase, oxidase and proteinase enzymes in acetone-washed powders prepared from samples of cacao beans taken throughout a commercial curing have been determined. The enzymes, and indeed all the proteins, are rendered insoluble by phenolic tanning immediately following the death of the bean. The relevance of this reaction to the quality of the processed bean is discussed. The enzymes, although insoluble, remain active but at much reduced rates. The necessity for slow drying becomes apparent when the degree of inactivation and immobilization of the enzymes is realized. [Authors' abstract.]—Colon. microbiol. Res. Inst., Trinidad.

3061. Brown, H. B.
Changes observed in cocoa due to fermentation and their relation to chocolate flavour.
Rep. Cocoa Conf. Lond. 1957, 1958, pp. 165-70, bibl. 15.

Chocolate flavour is analysed into 9 components, of which 3, namely, sugar, cocoa butter and purin bitterness, are independent of fermentation. The other 6 components, which depend on fermentation and roasting are: tannin body flavour, astringency, nutty flavour, aromatic flavour, fruitiness and roast effects. Their chemistry is considered in some detail. The importance of the endosperm tissue as a source of enzymes is also discussed. The main features in the formation of these flavour components are shown diagramatically.—Rowntree and Co., Ltd.

Coconuts.

(*See also* 3174, 3176m, 3177o, p, y.)

3062. Ceylon.
Annual Report of the Coconut Research Board of the Coconut Research Institute for 1956.
Ceylon Coconut Quart., 1957, **8**(1/2): 1-64, illus.

Work in progress includes the following: *Soil Chemistry:* Responses to P were obtained in 2 experiments, including one with young palms, but the long-term NPK experiment in its 21st year showed continued responses to K. Preliminary investigations on palm yellowing showed no deficiency of major nutrients. *Technological Chemistry:* Preparation of vinegar and dried yeast from toddy. *Botany:* Intra-specific hybrids between tall and dwarf palms showed promising yields and hardiness. In progeny trials there was no correlation between mother and daughter palm yields under open pollination but the value of seedling selection was confirmed. *Crop Protection:* Pest and disease control, particularly termite and *Oryctes* studies. [This report has also been summarized briefly in the report of the Director of Agriculture abstracted in *H.A.*, 28: 982.]

3063. Harland, S. C.
The improvement of the coconut palm by breeding and selection.
Bull. Coconut Res. Inst. Ceylon, **15**, 1957, pp. 14.

The following suggested programme is discussed:—the identification of prepotent high yielders and the production of paired crosses; the possible utilization of hybrid vigour; the study of selfing and search for haploids; the study of polyembryony, suckering and vivipary; seedling physiology and the correlation of seedling characters with adult performance; trials of vegetative propagation and regeneration; the study of nut weight and copra relationships.

3064. Frémond, Y., and Gros, D.
Inorganic manuring of the coconut palm in the Ivory Coast.
Planter, Kuala Lumpur, 1958, **34**: 171-9, bibl. 14.

Muriate of potash at ½, 1 and 1½ kg./palm/year markedly increased the leaf contents of K and Na, the number of nuts per palm and weight of copra per nut. The first ½ kg. increased yield by 23·8 nuts/year, the second ½ kg. by a further 6·1 nuts and the third ½ kg. by a further 1·4 nuts. Ammonium sulphate at 2 kg./palm/year reduced the K content of the leaves and depressed the weight of copra per nut. Dicalcium phosphate at 2 kg. produced no response. The use of potash was financially very profitable.—I.R.H.O.

3065. Gangolly, S. R., Gopalakrishnan, T. P., and Satyanarayana, B. S.
Investigations on the shedding of buttons in the coconut (*Cocos nucifera* Lin.). 2. Role of synthetic hormones as related to shedding of buttons.
Indian Coconut J., 1956, **9**: 135-60, bibl. 72, [received 1958].

Weekly sprays of 2,4-D at 30 p.p.m., applied just after fertilization, reduced the shedding of buttons. Earlier or more frequent spraying caused reduction in nut size. Copra yield was increased by 38% to 160% by hormone spraying. The addition of coconut water to the spray lessened its adverse effect on nut size. Mixtures of 2,4-D and P.C.P.A. were also effective. [See also *H.A.*, 24: 894, 25: 3267, and 27: 2850.]

3066. Gangolly, S. R., and Pandalai, K. M.
Fortifying influences of coconut milk and cow's urine on 2,4-dichlorophenoxyacetic acid in the control of button shedding in the coconut.
Nature, 1958, **181**: 855, bibl. 3.

The application of coconut milk or cow's urine with 2,4-D has increased fruit set and development in coconut and reduced the percentage of barren nuts formed. The synergistic effect of coconut milk was greater than that of cow's urine.—Centr. Coconut Res. Stat., Kasaragod, S. India.

3067. Nagaraj, A. N., and Menon, K. P. V.
Note on the etiology of the wilt (root) disease of coconut palms in Travancore-Cochin.
Indian Coconut J., 1956, **9**: 161-5, bibl. 10, [received 1958].

The disease was successfully transmitted under field conditions by mechanical inoculation and by the banana lace-wing bug, *Stephanitis typicus*, which may therefore be the vector.

3068. (Naylor, A. G.)
Dieldrex for root rot.
Fmr, Jamaica, 1957, **61**: 512-13, illus.

Where coconut palms are attacked by "root rot", the cause of which is unknown, the peripheral roots should be chopped away exposing clean tissue. The palm base should then be mounded up with soil, watered with 1 gal. Dieldrex 15, 1 part to 100 parts water, and shaded until new roots are formed.

3069. Fenwick, D. W.
Red-ring disease of coconuts in Trinidad and Tobago.
Rep. colon. Off., 1957, pp. 55 cyclostyled, bibl. in text.

This comprises a report on a visit of reconnaissance. Although red-ring disease, thought to be caused by the nematode *Aphelenchoides cocophilus*, and the palm weevil *Rhynchophorus palmarum* are often associated, the latter is not thought to be the vector of the disease. Red-ring normally affects trees under 10 years old and has the appearance of being soil borne. Seed nuts can be infected after falling on to the ground. The disease is more prevalent in swampy areas. Losses in Trinidad amount to 35% of young trees. A programme of research is recommended.

3070. Perez, C. B., Jr., and Carañgal, A. R., Jr.
Alkaline degradation of coconut milk.
Philipp. Agric., 1956, **40**: 195-208, bibl. 7, [received 1958].

Acetic, formic, lactic, oxalic, glycolic and malic acids were formed by alkaline degradation. Only 12·39 mg. of lactic, the most plentiful, acid was formed from 1 ml. of hydrolysed coconut milk with 1·5 N KOH after 72 hours at 24–30° C. Coconut milk is not therefore considered to be a promising source of lactic or other acids.

Coffee.

(*See also* 2070, 2479, 2511d, 3174, 3176f, 3177l, n, r, 3178b, c, e, h, 3196.)

3071. García Andrade, N., and others.
El café en Venezuela. **(Coffee in Venezuela.)**
Agric. venezol., 1957, **21**(196): 4-70, illus.

This issue is mainly composed of articles on growing, processing and marketing. N. García Andrade writes on the rejuvenation of plantations and on mealybugs and their control, J. L. Sánchez B. on pruning and on the effects of soil lime on nutrition, J. Henao Jaramillo on flowering and processing, and G. Buonaffina Parra on manuring. Anonymous articles are included on seed selection and treatment, early growth (nursery practices), diseases and pests, regional surveys, research and the training of growers. Annual trade figures are given for 1951–6 inclusive.

3072. Parreira, P.
Normas para a formação de mudas do café. Processo da semeadura direta nos recipientes. **(Rules for producing coffee seedlings for transplanting. Direct sowing in pots.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(367): 20-4.

Thin sheets of pine wood measuring 14×24 cm. to 23×41 cm. are treated with 5% copper sulphate or with warmed waste motor oil, rolled into cylinders and filled with a 1 : 2 mixture of weathered manure or compost and loam. Fine wire or rubber bands are used to hold them in shape and 2 seeds are sown in each after the "pots" have been placed in rectangular groups not more than 1·5 m. wide across nursery beds 15–20 m. long. The outermost pots of each group are protected from drought by planks or small tree trunks or by earthing up. Straw or dry grass is put down between the groups and as a covering 2–4 cm. thick over the pots, which are watered daily. After 40–60 days, when germination is in progress, the grass mulch is carefully removed and the weaker seedling in each pot is destroyed. Shade is gradually reduced after 2 pairs of foliage leaves have appeared, so that complete exposure to sun is attained 30–40 days before transplanting. Taproots extending below the pots are severed.

3073. Castillo Z., J.
Observaciones sobre la relación del crecimiento del cafeto y temperatura, en condiciones de campo. **(Observations on the relationship of coffee growth to temperature under field conditions.)**
Cenicafé, 1957, **8**: 305-13, bibl. 17.

A detailed study was made in Colombia of correlations between growth of coffee shoots (measured weekly) and meteorological factors over a period of 14 months. Statistical analyses showed that the most influential factor was the night temperature above 20° C., which had a stimulating effect on growth made some 3–4 weeks later. Day temperatures above 25° C., 26° C. or 27° C., hours of sunshine, daily variation in temperature and daily variation in light intensity appeared to have some effect but the correlations were not significant. There was no correlation between growth and maximum temperature.

3074. Mes, M. G.
Studies on the flowering of *Coffea arabica* L. III. Various phenomena associated with the dormancy of coffee flower buds.
Portugal. Acta biol., Sér. A, 1957, **5**: 25-44, bibl. 23, illus.

Considerable internal moisture tension was found in stems and petioles, but not in inflorescence stalks, of coffee shoots bearing mature flower buds. Anatomical studies showed that these stalks were poorly supplied with xylem, but that this tissue rapidly increased as bud growth was resumed after a period of dormancy, imposed by water stress, which intervened between the differentiation of microspore mother cells and their meiosis. Meiosis and subsequent bud growth was associated with a sudden increase in water content. The results suggest that in areas where coffee flower buds mature during the dry season, it should be possible by means of sprinkler irrigation to regulate the flowering of those varieties which exhibit imposed dormancy of the flower buds. [For parts I and II see *H.A.*, 28: 1875.]

3075. Uribe Arango, H.
El cultivo del café al sol en Colombia. **(Growing unshaded coffee in Colombia.)**
Rev. cafet. Colomb., 1958, **14**(134): 31-4.

Preliminary experiments with bourbon and typica coffee, with and without fertilizers, showed a 152% higher total yield from exposed than from shaded plots. Bourbon, unshaded and fertilized, produced 4 times as much cherry as shaded typica, without fertilizers. Yields of fertilized typica were 185% higher in sun than in shade. These results cover only 2 years and thus need confirmation. In a 4-year manurial trial without shade, yields from strip-cultivated coffee, manured with 5 gal. of decomposed coffee pulp + 250 g. of N fertilizer per tree, were nearly 5 times as high as the average production under shade. Neither a leaf mulch nor 1 kg. of 8–8–8 fertilizer per tree increased yields under these conditions.

3076. dal Pozzo Arzolla, J., Haag, H. P., and Malavolta, E.
Nota preliminar sôbre a absorção e a translocação do radiozinco no cafeeiro (*Coffea arabica*) cultivado em solução nutritiva. **(Preliminary note on absorption and translocation of radioactive zinc by coffee (*Coffea arabica*) grown in nutrient solution.)** [English summary 1 p.]
An. Esc. sup. Agric. Queiroz, 1955/56, **12/13**: 113-20, bibl. 6, [received 1958].

Uptake of Zn by coffee plants grown in water culture was unaffected by varying the Fe concentration of the nutrient solution within the range 0–10 p.p.m., but was approximately halved by raising the Mn concentration from 0·5 to 5 p.p.m., the Cu from 0·02 to 0·2 p.p.m. or the Mo from 0·01 to 0·1 p.p.m. When Cu was omitted, Zn uptake increased, but this effect did not follow omission of either Mn or Mo. Foliar absorption of Zn was up to 8 times as high as root absorption, particularly where the solution was applied to the lower surfaces of the leaves, about 40% of the applied Zn being absorbed and about 12% translocated, mainly downwards.

3077. Henrard, P.
***Colletotrichum coffeanum*, Noack.**
Agricultura, 1957, **5**: 38-55, from abstr. in *J. Sci. Food Agric.*, 1958, **9**: i-72.

The biology of the pathogen and its effects on arabica coffee are discussed. Among 12 fungicides tested for its control, the most effective were captan, ferbam and Tuzet.

3078. Echandi, E., and Segall, R. H.
The effectiveness of certain eradicant fungicides on inhibition of gemmae of *Mycena citricolor*.
Phytopathology, 1958, **48**: 11-14, bibl. 7, illus.

American leaf spot disease (*Mycena citricolor*= *Omphalia flavida*) of coffee was controlled by 3 dry-season applications of certain mercury-containing fungicides. This treatment gave control as good as, or better than, 9 applications of copper fungicides made during the dry and rainy seasons. It is unsuitable for practical use, however, owing to the toxic mercury residues in the harvested beans.—Minist. Agric. Costa Rica, and U.S. Operations Mission to Costa Rica, San José.

3079. Echandi, E.
La quema de los cafetos causada por *Phoma costarricensis* n.sp. **(Burn of coffee trees caused by *Phoma costarricensis* n.sp.)**
Rev. Biol. trop., 1957, **5**(1): 81-102, from *Supl. bibl. Turrialba*, 1957, Vol. 7, Abstr. 461.

The fungus is a wound pathogen and can be spread by *Idiarthron atrispinum*. The disease, which is serious in Costa Rica, begins to appear soon after the start of the rainy season. In preliminary field trials Orthocide W-50 and Tuzet+aldrin gave promising control.—Univ. Costa Rica, San José.

3080. Dadant, R.
Le pourridié du caféier à Madagascar. **(Root rot of coffee in Madagascar.)**
Café, Cacao, Thé, 1957, **1**: 126-31, illus.

The parasitic fungus *Clitocybe tabescens* can survive for 6–7 years in dead coffee or other wood. Various hosts are listed, a very common one being *Albizzia lebbeck*, the principal coffee shade tree of Madagascar. No effective fungicidal treatment has yet been evolved. Spread of the disease has been successfully checked by ascertaining the exact extent of every diseased section of the plantation and bark-ringing every diseased tree and every healthy coffee and shade tree in a belt surrounding the diseased patch. The exposed wood is treated with mineral oil to prevent bark renewal and after exhaustion of root carbohydrate reserves and subsequent death these trees form a barrier against the fungus. The method is suitable for extensive plantations. For small-scale plantations the only answer is complete eradication.

3081. Viégas, A. P.
Podridão das raízes do cafeeiro. **(Root rot of coffee.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(368): 7-16, and (369): 10-19, bibl. 14.

Arabica coffee was the only species found to be affected by root rot in S. Paulo state. The pathogen was identified as *Marasmius viegasii* n.sp. The control measures recommended are the use of vigorous, healthy transplants, liberal manuring and adequate drainage.

3082. Bonilla, E.
La llaga negra del cafeto y su combate. **(Black root rot of coffee and its control.)**
Rev. cafet. Colomb., 1958, **14**(134): 35-8, illus.

Coffee trees affected by the root fungus *Rosellinia bounodes* were cured by exposing and treating the root collar with 5 gal. per tree of a 1·5% suspension of Terraclor.

3083. McCrae, D. J.
Airspraying against antestia and lacebug in coffee.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 94-5.

Effective control was obtained using malathion 50% emulsion concentrate at 2 pt. in 2 gal. water per acre. Some hatching of lacebug (*Habrochila ghesquierei*) nymphs occurred 2 weeks after spraying. Spraying was done by fixed-wing aircraft in the early morning and about 130 acres were treated in a day. Costs were lower than those of ground spraying.

3084. Lavabre, E. M.
Le sphinx du caféier et les moyens de le contrôler. **(The coffee hawkmoth and means of controlling it.)**
Café, Cacao, Thé, 1957, **1**: 132-3, bibl. 6, illus.

Complete control of larvae of *Cephonodes hylas* was achieved in under 12 hours by spraying coffee foliage with an emulsion of 19·5% endrin. It acted more rapidly than DDT and was more persistent than rotenone.—Centre Rech. agron. N'Kolbisson, Cameroun.

3085. Pagacz, E.
Lutte contre la chenille mineuse des feuilles du caféier robusta. **(Control of the leaf miner of robusta coffee.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 67.

Endrin at 500 g. of active material per ha. (2·6 l. of a 19·5% emulsionable solution) in 800–1,000 l. of water, gave excellent control of leaf miners. Parathion, although more rapid in action, was less satisfactory, because of its much weaker residual action.

3086. Robinson, J. B. D.
Some chemical characteristics of "termite soils" in Kenya coffee fields.
J. Soil Sci., 1958, **9**: 58-65, bibl. 11, illus.

Soil taken from the "runs" of the termite *Odontotermes badius* in mulched coffee plantations was higher in pH and richer in exchangeable Ca and Mg than the adjacent topsoil. From the point of view of soil chemistry therefore, the termites were not detrimental to the coffee.—Dep. Agric., Kenya.

3087. McCloy, J. F.
Progress in coffee drying research.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 65-8.

Any machine drying must necessarily be detrimental to quality in so far as it reduces the time during which the coffee is exposed to sunlight. Lack of light treatment is shown by incomplete bleaching of silver skins and the presence of green-yellowness in the bean instead of blueness. Colour development is probably caused by visible light and not by either ultra-violet or infra-red rays. Excessive sourness in machine dried coffee is due to too high a drying temperature. Coffee varies in its resistance to machine-drying damage. Low quality coffee, especially from low altitude areas, suffers more than high quality coffee. Excessive yellowness in silver skins at picking time may be an indication of susceptibility. Machine-dried coffee is more subject to storage damage than sun-dried coffee. The storage of coffee which is wetter than the very hard black stage may result in deterioration even when "heating" does not obviously occur. [From author's conclusions.] Recommendations for constructing driers and for drying arabica coffee in wet weather are given.—E. Afr. ind. Res. Org.

Mangoes.

(*See also* 2953, 3176u, 3177e, f, z, 3178 l.)

3088. Sachar, R. C., and Chopra, R. N.
A study of the endosperm and embryo in *Mangifera* L.
Indian J. agric. Sci., 1957, **27**: 219-28, bibl. 26, illus.

Nineteen varieties of *M. indica* and one of *M. odorata* were studied. Six exhibited polyembryony, the zygote usually degenerating. The remainder had single embryos, usually zygotic in origin. The development of the endosperm and embryo is described in detail.

3089. Carmichael, W. W.
Rejuvenation of old mango groves by hedging or top-working to new varieties.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 290-1.

The method of top-working recommended is as follows: saw back the branches to the desired height, leaving one as a shock-absorber; select new sprouts, which may be tip-grafted when their diameter is ½ in.; remove sprouts around the new grafts; remove the shock-absorber branch when the new scions are about 2 ft. long. The best results in South Florida have been obtained by cutting back in late October or November.

3090. Singh, L. B.
Biennial bearing in mango.
Hort. Advance, 1957, **1**: 7-22, bibl. 38, illus.

Numerous factors which could play a part in the irregular cropping of mangoes are considered in some detail, and an arithmetical formula is suggested for providing a measure of this habit in different varieties. The evidence suggests that a biennial bearing habit is an inherited character, which tends to become more pronounced as the tree grows older. There are indications that a flowering hormone is present in the leaves, which is depleted through the fruit rather than the inflorescence. Preliminary observations suggest that defoliation may provide a means of regulating bearing, since fruit bud formation appears to depend on the quantities of flowering hormone and starch present at the time of bud differentiation.

3091. Singh, M. P.
A probable mineral deficiency in mango under field conditions.
Hort. Advance, 1957, **1**: 48-54, bibl. 8, illus.

Symptoms of tip-burn and marginal necrosis, which are described and illustrated in detail, appear to be due to P deficiency induced or aggravated by low Mg. The amounts of Ca, K, P and Mg found in leaves from normal and affected trees, both young and old, are tabulated.

3092. Young, T. W.
"Soft-nose", a physiological disorder in mango fruits.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 280-3, bibl. 2, illus.

Soft-nose is a breakdown of the flesh on the ventral side and towards the apex of mango fruits that are still on the tree. No definite information is available on the effects of environment on its incidence, but there are indications of increasing soft-nose with increasing N levels. Less soft-nose occurs in fruit picked early than in fruit which has started to ripen before picking, and varietal differences in soft-nose incidence have also been observed.

3093. Aragaki, M., and Goto, S.
Mango anthracnose control in Hawaii.
Plant Dis. Reptr, 1958, **42**: 474-5, bibl. 1, illus.

Captan at 3 lb. per 100 gal. gave excellent control of mango anthracnose (*Colletotrichum gloeosporioides*). Zineb gave results significantly better than the control, but ziram and basic copper sulphate were not satisfactory.—Univ. Hawaii, Honolulu.

3094. Singh, S. M.
Control of mango mealy bug *Drosicha mangiferae* Green).
Hort. Advance, 1957, **1**: 38-47, bibl. 15, illus.

In laboratory trials 0·04% diazinon killed 100% of gravid female mealy bugs within 7 days. Comparable figures for 0·04% parathion and 0·375% malathion were 96·3% and 17·3%. Diazinon at 0·025% also killed all first stage nymphs within 1–2 days. Under field conditions 0·033% diazinon caused 96·2 to 100% mortality of first and second stage nymphs.

3095. Popenoe, J., and Long, W. G.
Evaluation of starch content and specific gravity as measures of maturity of Florida mangos.
Proc. Fla St. hort. Soc., 1957, 1958, **70**: 272-4, bibl. 3.

Mangoes sampled at weekly intervals during the maturation period showed a regular increase in starch content, specific gravity and flavour. Starch content and specific gravity were shown to be related to maturity and flavour of hard green mangoes, but could not be used as a commercial measure of maturity. —Agric. Mktg Serv., U.S.D.A., Fla.

3096. Mukerjee, P. K., and Smock, R. M.
The effect of ripe mangoes on unripe mangoes.
Hort. Advance, 1957, **1**: 34-7, bibl. 4.

Accelerated ripening of green mangoes at room temperatures and at 48° F. resulted from introducing air which had previously been passed over ripe mangoes. When mangoes were kept in boxes with unsealed polyethylene liners, the presence of slightly ripe fruit also appeared to accelerate ripening in green fruit in the same box.

Oil palms.

(*See also* 2481, 3176e, 3177d.)

3097. Institut National pour l'Étude Agronomique du Congo Belge, Division du Palmier à Huile.
La conservation des graines d'*Elaeis*. **(Storage of oil palm seeds.)**
Bull. Inf. I.N.E.A.C., 1958, **7**: 31-7, bibl. 3.

Oil palm seeds harvested at each of 4 seasons (Feb., Apr., Aug., Nov.) were sown in germination boxes and warm frames after storage for 10 days, 1½ months, 2½ months and 6 months. Percentage germination was unaffected by heat or by storage up to 6 months, but the later the harvesting date the higher, in general, was the percentage. The speed of germination was inversely related to duration of storage; the only effect of harvest date on this factor was somewhat slower germination of seeds from the November harvest sown in heat.

3098. Wormer, T.
Croissance et développement du palmier à huile. **(Growth and development of the oil palm.)**
Oléagineux, 1958, **13**: 385-93, bibl. 6.

A study of 450 Deli Dura nursery seedlings gave the following results: maximum production of fresh matter over a 2-month period was 24·7 g. per plant per day or 110 kg. dry matter per ha. per day using about 1·5% of the available energy for photosynthesis; height and weight of plants were closely correlated; there is a precise relationship between the fresh weight of the plant and the fresh weight of its leaves; at the end of the nursery period a well-grown palm has developed 68 leaves, of which 18 have died, 15 are mature, 8 are over 20 mm. long and in rapid growth, 9 are between 5 and 20 mm. long, and 18 are less than 20 mm.; the ratio between total number of leaves and number of primary roots is constant and about 1; the number of leaflets increases by about 4 per leaf; the first visible floral bud should appear between the 25th and 41st leaf 19 months after germination.—I.R.H.O.

3099. Haines, W. B.
Réapparition cyclique de rendements élevés chez des palmiers analysés individuellement. **(A cycle of high yields in palms individually analysed.)**
Oléagineux, 1958, **13**: 367-73, bibl. 1.

A study of the yields of individual oil palms showed a tendency to produce maximum yields every 3 years. The effects of P and K and of variety on this cycle and the interactions between these factors are discussed.

3100. Prevot, P., and Peyre de Montbreton, C.
Étude des gradients en divers éléments minéraux selon le rang de la feuille chez le palmier à huile. **(Study of the gradients of different mineral elements according to leaf order in the oil palm.)**
Oléagineux, 1958, **13**: 317-21, bibl. 6.

A study of the mineral content of successive leaves of the oil palm indicated that the N, P and Mg gradients were variable, whereas the K, Ca and ash gradients were fairly constant with factors of 0·020% and 0·025% per leaf number for K and Ca respectively. In leaves older than the ninth, the N/P ratio was independent of leaf position and could be used to show a relative deficiency of either N or P. The gradients with leaf order showed a general increase for Ca, Mg and ash and a decrease for P and K. With N there was a tendency for the content to increase until the ninth leaf and then to decrease. Disturbances to the Ca and Mg gradients in the older leaves could be used to indicate deficiencies of these elements.

Papaws.

(*See also* 2099, 3176p.)

3101. Choudhri, R. S., Garg, O. K., and Borah, P. C.
Physiological changes in relation to sex in papaya (*Carica papaya* L.). [Spanish summary ½ p.]
Phyton, 1957, **9**: 137-41, bibl. 15.

Leaves of male papaw plants were richer in total carbohydrates, P and chlorophylls *a* and *b* than those of female plants. They also showed greater catalase activity and a higher respiratory rate. Leaves of female plants were richer in total N and K, carotene and xanthophyll; pH concentration of the sap, photosynthetic rate and ascorbic acid content were also higher in leaves of female plants. Total carbohydrates and catalase activity were higher, but N content was lower, in female flowers than in male flowers. The reverse trends of carbohydrate and N accumulations in the leaves and flowers of male and female plants indicates differential transport of nutrients from leaves to flowers. It is concluded that it may be possible to predict the sex of papaw plants by a study of their physiological metabolism, and even to control their sex by physiological adjustments.—Coll. Agric., Banaras Hindu Univ.

3102. Valenciano, O. A., and others.
Estudio bromatológico del fruto de la *Carica papaya* L. (**Chemical study of the fruit of *Carica papaya*).** English summary.]
An. Bromatol., 1956, **8**: 197-203, from *Food Sci. Abstr.*, 1957, Vol. **29**, Abstr. 2511.

This is the first of a series of reports on the chemical composition of Argentine fruits, and deals with the origin, distribution, botanical and histological characteristics of the papaw and the chemical composition of its fruit. The fruit contained 88·33% of water, 0·5% of protein, 0·17% of lipids, 7·5% of total sugars, 6·26% of reducing sugars, 1·41% of sucrose, 1·05% of crude fibre, 0·56% of ash, 0·6% of acid (determined by titration with alkali) or 0·04% (calculated as citric acid); the energy value per 100 g. was 34·38 cal. and the nutritive value (calculated by Atwater's formula) 15·8.

3103. Singh, L. B., and Tripathi, R. D.
Studies in the preparation of papain—IV. Effect of different intervals between the lancing of papaya fruit on the yield and quality of the latex, and yield of crude papain, as also on the yield, flavour and time of ripening of the lanced fruits.
Hort. Advance, 1957, **1**: 102-5, bibl. 4.

Bi-weekly lancing gave a higher yield of latex and crude papain as compared to weekly lancing. These treatments did not affect the activity of the latex. The yield, total solid percentage of the juice and the date of ripening of fruits also remained unaffected. [From authors' summary.]

3104. Singh, L. B., and Tripathi, R. D.
Studies in the preparation of papain—III. Effect of alcohol, acetone and sodium bisulphite on the quality and recovery of the enzyme.
Hort. Advance, 1957, **1**: 95-101, bibl. 4.

Papain prepared with an optimum latex-alcohol ratio of 1 : 5 had a higher proteolytic activity than raw latex. Acetone treatment of alcohol-precipitated papain caused quick drying and increased activity. Pretreatment of latex with sodium bisulphite increased initial activity and, when used at 0·2%, increased storage life.

Pineapples.

(*See also* 2953, 31761, z, 3177s, t.)

3105. Pan, K. Y.
Research on the three essential fertilizers for pineapples. [Chinese, with English summary 1½ pp.]
J. agric. Ass. China, 1957, No. 19, pp. 11-29, bibl. 18.

Three levels of N, P and K were applied in 27 combinations. K produced the best growth response, and NK was better than NP, PK and NPK for the plant crop. NK also encouraged sucker and slip growth, but NPK resulted in the best growth of ratoon crops. P alone produced fruit of poor quality and flavour. High yields of good quality fruit were produced when both N and K were present. Increasing applications of N and K resulted in increased leaf contents of N and K, but increasing applications of P did not produce an increased leaf P content. Normal leaf nutrient contents were N 1·5–2·0%, P 0·7–0·8%, and K 3·5–4·0%. For practical purposes a 3 : 1 : 5 N : P_2O_5 : K_2O ratio is recommended for the growing period and a 5 : 1 : 3 ration for the fruiting period.

3106. Samuels, G., and Gandía Díaz, H.
Influence of the number of fertilizer applications on pineapple yields. [Spanish summary ¼ p.]
J. Agric. Univ. P.R., 1958, **42**: 7-11, bibl. 5.

One application of mixed fertilizers at time of planting gave yields equal to, or better than, splitting the same quantities of fertilizer into 2 or 3 dressings applied at intervals up to 8 months later.

3107. Samuels, G., Alers-Alers, S., and Jackson, G. C.
Influence of fertilizers on yields of pineapples on a Coto clay. [Spanish summary ¾ p.]
J. Agric. Univ. P.R., 1958, **42**: 12-26, bibl. 7.

Nitrogen at 480 lb./acre gave the highest yields; P had no effect and K caused only a small increase in yield. Leaf-N and leaf-K but not leaf-P were correlated with relative yield. Ferrous sulphate spray and chelated iron both increased yields, but iron malonate, magnesium oxide and zinc sulphate had no such effect. A glass frit containing Fe and other trace elements gave increases similar to the ferrous sulphate spray at a lower cost.

3108. Johnston, A.
Pineapple fruit collapse.
Malay agric. J., 1957, **40**: 253-63, bibl. 8, illus.

This disease, the symptoms of which include liquefaction of the fruit tissues, olive-green discoloration, rotting and collapse, was shown to be caused by the same strain of *Erwinia carotovora* that causes heart-rot of young pineapple plants [see *H.A.*, 28: 901]. The disease only affects fruits approaching maturity and is worst in recently planted plantations and where drainage is poor. Streptomycin sulphate, applied as a 0·1% spray at weekly intervals, reduced disease incidence but was not an economic control measure. Field sanitation is at present the best means of control.

3109. Pérez, M. E.
Pineapples gummosis in Puerto Rico and its control. [Spanish summary 1 p.]
Tech. Pap. Univ. P.R. agric. Exp. Stat. **21**, 1957, pp. 71, bibl. 28, illus.

Gummy exudation from the fruit was shown to be caused by the larvae of a cosmopterygid moth, *Batrachedra* sp. The female moths are attracted to the blossoming plants for oviposition. Control was achieved using sprays of chlordane, Rhothane, toxaphene, parathion, heptachlor and aldrin. At least 3 applications were needed. Solutions of formic and oxalic acids also caused gum exudation when applied to pineapple fruits, but only when water was also provided.

Rubber trees.

(*See also* 2480, 3176c, d, x, 3177g, u, 3178k.)

3110. Anon.
Buddings and clonal seedlings.
Plant. Bull. R.R.I.M., 1958, No. 36, pp. 51-9.

From the results of trials here tabulated the following conclusions are drawn: "Buddings are in general superior to seedlings in the all-important matter of yield. They can be tapped at a higher intensity; their shape gives more scope for the utilization of bark, leaving more time for bark renewal. On the score of the rate of girthing, thickness of the virgin bark and the rate of bark renewal, the recommended planting material of either type differs too little for one to be held to have an advantage over the other, provided both are employed at the recommended densities—which also are in the right range for economic tapping. In securing a regular stand, the uniformity of clones weighs in their favour, while the necessity for extra thinning counts against clonal seedlings. It also adds to the cost of planting, largely offsetting the saving of a year compared with the clones budded in the field. Even so, somewhat cheaper costs can be obtained with clonal seedlings in the hands of those who do not intend to practice good husbandry. The variability of clonal seedlings is to some extent in their favour from the point of view of spreading disease risks, and also for the resulting average quality of their latex. Finally there is the most important point that the improvement and multiplication of clones proceeds faster than the improvement and production of clonal seedlings. It is unlikely that this trend will be reversed within the foreseeable future."

3111. Lescano Alva, M.
Clones productores y resistentes a la SALD. **(High-yielding hevea clones resistant to South American leaf blight.)**
Bol. trim. Exp. agropec. P.C.E.A. Lima, 1956, **5**(4): 12-14, [received 1958].

Most of the new resistant clones are from *Hevea brasiliensis* × *H. benthamiana*. Their yield range at a density of 420 trees per ha. is 800–1,200 kg. of dry rubber. They withstand wind well and are not prone to tapping panel disorders. Further selection is in progress to combine resistance to *Pellicularia filamentosa* with the other desirable features.—Estac. exp. agríc. Tingo María.

3112. Muzik, T. J., and Cruzado, H. J.
Transmission of juvenile rooting ability from seedlings to adults of *Hevea brasiliensis*.
Nature, 1958, **181**: 1288, bibl. 4.

Attempts were made to induce juvenility and thereby enhance rooting ability in hevea by grafting buds from a mature hevea clone onto seedling plants. Buds taken from branches of 8–10-year-old trees were grafted at the base of stems of 12-month-old seedlings. When the buds had grown 3–5 ft., cuttings were made and planted under a mist spray. At the same time buds were taken from the scions and grafted onto other seedlings. This sequence of budding and planting cuttings was repeated 4 times. Cuttings from scions of the fourth and fifth graftings gave 30% rooting in about 8 weeks, whereas cuttings from the original clone and from the first 3 graftings failed to root. Treatment of cuttings with various extracts from seedling stems failed to improve the rooting ability of the adult plant. These results indicate that the juvenile form may transmit a substance to the adult which induces the adult to assume juvenile characteristics; this substance is not readily soluble in ordinary solvents but may be slowly absorbed and accumulated by the scion.—Fed. exp. Stat., Mayaguez, Puerto Rico.

3113. Bolle-Jones, E. W.
Copper: its effects on growth and composition of the rubber plant (*Hevea brasiliensis*).
Plant and Soil, 1957, **9**: 160-78, bibl. 16, illus.

Rubber seedlings were grown in sand culture at Cu levels of (1) 0·001 p.p.m., (2) 0·008 p.p.m., (3) 0·064 p.p.m. and (4) 0·512 p.p.m. Deficiency symptoms at level (1) included extensive apical defoliation, dieback and stunting. The Cu status was better represented by number of leaflets per plant or by stem girth than by plant height, and the Cu content of roots appeared more representative than that of leaf blades. At levels (1) and (2), leaves contained 2–3 p.p.m. (dry weight) of Cu and were much richer in N, P, Mg and Mn, but poorer in chlorophyll, than those at level (3). Low Cu status was also associated with increases of N, P and Mn and decreases of K and Fe in the roots, and with increases of rubber and most mineral elements in the stems. The accumulation effects were mainly secondary, resulting from retarded growth, but there was some evidence of direct depression of K and Fe absorption. In general, accumulation of rubber and minerals increased in the roots and decreased in the stems with increasing Cu supply.—Rubber Res. Inst. Malaya, Kuala Lumpur.

3114. Bandurski, R. S., and Teas, H. J.
Rubber biosynthesis in latex of *Hevea brasiliensis*.
Plant Physiol., 1957, **32**: 643-8, bibl. 24.

Hevea latex has been demonstrated to catalyse the incorporation of C^{14}-labelled acetate into rubber *in vitro*. The incorporation of acetate into rubber is stimulated by the addition of sucrose and a cofactor mixture containing adenosine triphosphate, coenzyme A, diphosphopyridine nucleotide, magnesium ion, fructose diphosphate and potassium phosphate. The enzyme system responsible for conversion of acetate into rubber remains in the supernatant fluid following centrifugation of latex at 15,000 × g. C^{14}-labelled pyruvate and β-methylcrotonate are incorporated into rubber by the latex enzyme system, whereas sucrose and $C^{14}O_2$ are not. That acetate is in fact incorporated into rubber has been demonstrated by a comparison of the specific activities of rubber isolated as rubber and as the bromide with that of levulinic 2,4-dinitrophenylhydrazone prepared by ozonolysis of the biosynthesized rubber. [From authors' summary.]

3115. Wiersum, L. K.
Quelques aspects physiologiques de l'étude du latex. **(A few physiological aspects in the study of latex.)** [English, German and Italian summaries ½ p. each.]
Rev. gén. Caoutch., 1958, **35**: 276-80, illus. translated from an article in Dutch in *Vakbl. Biol.*, 1957, 37(2): 17-24.

Latex stimulation by growth substances is not harmful. It does, however, take place at the expense of secondary thickening, but this, in adult trees, is not of great consequence. This conclusion is discussed in the light of investigations by the author in Java and by other workers elsewhere.

3116. Liefstingh, G.
Zwaartap. **(Intensive tapping.)** [Indonesian summary 14 lines.]
Bergcultures, 1957, **26**: 611-21, bibl. 10, illus.

Experience in intensive tapping systems is discussed. In a small trial there were indications that production was higher when one spiral cut in virgin bark was upwards, than when both were downwards. The use of stimulant paste did not increase production with intensive tapping. Practical advice applicable to Java and south Sumatra is given.

3117. Anon.
Root disease and replanting.
Plant, Bull. R.R.I.M., 1958, No. 35, pp. 35-41.

The results of recent experiments have led to revised advice on detection and treatment. Regular collar inspection is no longer advised. Canopy inspection is sufficient, and the treatment of diseased trees should be reduced to pruning diseased roots and the application of tar. Cover cropping aids the rapid decay of timber, and it is better to encourage old stumps to decay than to dig them out. Tree and stump poisoning followed by burning is recommended when an old area is clear-felled.

3118. Risdon, E. J.
Choice and application of fungicides to plantation crops, with special reference to *Hevea brasiliensis*.
Nature, 1958, **181**: 1017-18, bibl. 6.

Most of the fungicides recommended for the control of defoliation in hevea, caused by *Oidium heveae* and *Phytophthora palmivora*, contain technologically active ingredients, such as copper, sulphur or dithiocarbamates, which are apt to affect the quality of the rubber produced by the trees. In the absence of satisfactory protective devices, which would prevent contamination of the tapping panel, the permissible extent of contamination must be considered in detail for each fungicide. On the basis of data collected during the period 1955–1957, it is suggested that fungicides that contain an ingredient, which adversely affects natural rubber when present at a concentration of about 8–10 p.p.m., should only be used on mature trees in tapping with very strict care at all stages in the field and in the factory, even when the dust formulation used contains no more than 1% of the active agent.—Rubber Res. Inst., Ceylon.

Sugar cane.

(*See also* 2482, 2483, 3176j, n-r, t, w, 3177a, m, q, v.)

3119. Bolton, J., Knowles, W. H. C., and Carmichael, N.
Record of investigations 1954-55.
Bull. Dep. Sci. Agric., Barbados, **23**, 1956, pp. 40, bibls, [received 1958].

The following results of sugar cane experiments are included (pp. 5-21): *Potash manurial trials:* The mean response of plant cane to muriate of potash applications up to 1½ cwt./acre averaged 1·33 tons per cwt.; response of first and second ratoons averaged 2·41 tons per cwt. of the current year's application. Residual effects were apparent over at least 2 years, residual potash from the previous year being 50–60% as effective as the current's year's application. 4×3×2 *KNP trials:* Yield and leaf analysis data showed a linear response to N for plants and ratoons up to 3 cwt./acre, the optimum dressing being higher than this figure. No responses to P were observed, and a lack of K response was attributed to residual K from previous treatments. *Experiments on the application of bagasse:* Applications of 12 tons/acre dried bagasse caused yield increases of 5·23 to 11·07 tons cane/acre, which were independent of whether the bagasse was forked in or left on the surface and whether the standard N dressing was applied whole or split. *Experiments on rates of subsoil chiselling and siting of cane holes:* The tentative conclusion was reached that subsoiling through the cane holes and the banks is not superior to the cheaper method of subsoiling down the banks only. *Modifications of cultivation techniques on the camber bed system:* Furrowing or cane holing appeared better than flat planting; mulching caused no yield increases.

3120. Bolton, J.
Record of investigations 1955-56.
Bull. Dep. Sci. Agric., Barbados **25**, [1957], pp. 24.

The following results of sugar cane experiments are included: *Residual effects of food crops on plant cane:* no adverse effects followed catch cropping and planting cane through food crops nor did any beneficial effect result from a leguminous catch crop. *Ratoon cultivation trials:* tractor ploughing to cultivate ratoons had no significant effect on the subsequent crops. *Irrigation investigations:* economic yield increases and an increased response to N resulted from irrigation. Potential evapotranspiration was studied using meteorological data. Soil moisture measurements showed significant increases under a trash mulch. [See also abstract 3130 below.]

3121. Tabayoyong, F. T.
Summary of experimental work on sugar cane 1955 to 1956.
Sugar News, 1957, **33**: 635-43, and reprinted in *Sugar J.*, 1958, **20**(10): 25-33.

Reported results from the Victorias Milling Company's Agricultural Research Department's experiments include the following: *Soils work:* The critical low pH level for profitable growth was 4·5. *Variety experiments:* The standard variety H.37-1933, which is susceptible to leaf-scorch disease, has been out-yielded by H.44-3098, C.P.29/116, N:Co.310, H.39-3633 and Q.50. In a time-of-harvest trial P.O.J.3016 yielded most profitably when reaped at 11 to 12 months. *Fertilizer experiments:* Suitable applications for various soil types are listed. Lime and potash, applied alone, both increased yields but the highest yields were obtained when both were applied together at 4 tons lime plus 180 kg. K_2O/ha. *Disease control:* Leaf scorch was the only serious epidemic, and the results of variety resistance trials are reported. *Pest control:*

Woolly aphis was effectively controlled by Pestox. Mass production methods for *Trichogramma* parasites of cane borers are described.

3122. ARTSCHWAGER, E., AND BRANDES, E. W.
Sugarcane (*Saccharum officinarum* L.): origin, classification characteristics, and descriptions of representative clones.
Agric. Handb. U.S. Dep. Agric. **122**, 1958, pp. 307, bibl. 41, illus.

The greater part of this book consists of botanical descriptions of some 350 clones of noble canes collected in the New Guinea, New Caledonia and Hawaii areas. These are prefaced by a discussion of the position of *S. officinarum* in the genus and its probable geographic origin and dispersal. In the authors' view, the noble canes originated in New Guinea and the main migration routes and centres of diversification through natural hybridization with wild grasses are postulated. Consideration is given to the taxonomy and genetics of the sugar canes and to such historical and other evidence as is available regarding their spread. Finally a taxonomic key is provided to assist in the identification of the clones described in the book. There are very adequate illustrations of the morphological characters which feature in the key and descriptions. Sugar cane from the aboriginal gardens of Melanesia are the remote ancestors of the present day cultivated varieties and this handbook provides a valuable key to the extensive store of genetic material still available from these sources.

3123. SALVIOLI, R. A.
Descripción de variedades agrícolas de caña de azúcar. **(Description of agricultural varieties of sugar cane.)**
La creación de una raza de caña de azúcar por acción de la colchicina. **(Creation of a variety of sugar cane by the action of colchicine.)**
Miscelanea Univ. nac. Tucumán. Fac. Agron. **6**, 1957, pp. 5-29, bibl. 7, illus., and pp. 31-5, bibl. 4.

Criteria of classification (stem and leaf features) are discussed and a key is given by means of which the 47 varieties are distinguished. These include Tucumanas, Coimbatore, Campo Brasil, Canal Point, and P.O.J. types, each of which is described, in many instances with a diagram showing its ancestry. A polyploid with chromosome number (2n) between 168 and 172 was produced by the action of 0·6% colchicine on buds of P.O.J. 2725 (2n=108).

3124. SKINNER, J. C.
Sugar cane selection experiments. 1. Bunch planting.
Tech. Commun. Qd Bur. Sugar exp. Stats **1**, 1957, pp. 29, bibl. 10, illus.

In a comprehensive experiment to compare the Hawaiian selection technique of bunch planting with single seedling planting, bunch planted seedlings of the polycross Trojan × ? were selected in 3 classes, "best", "medium" and "worst", and compared with a "random" class obtained from unselected single planted seedlings of the same cross. Selection from the bunch planting was very effective as shown by the highly significant superiority of the "best" over the "random" class. The success of the method depended largely on the selection of bunch-planted seedlings with good tops, selection for brix and stooling taking place at a later stage. It is concluded that bunch planting provides a very promising selection method under Queensland conditions. The paper includes full statistical analyses of all relevant data.

3125. MUTHUSWAMY, R., AND ARAVAMUDHAN, P.
Dual action seed treatment for sugarcane.
Indian J. Sugarcane Res., 1958, **2**: 61-70, bibl. 11.

Setts of B.O.17 were steeped for 10 minutes in various combined fungicide-insecticide solutions before being planted in March in a soil moderately infested with termites, and the effects on germination, tillering, growth, termite attack and yield were recorded. The highest yields were obtained with ½ lb. 3% Aretan or Agallol plus 0·2 lb. actual aldrin in 10 gal. water. This treatment also stimulated germination. Aretan/dieldrin gave the next best results. [For similar trials on autumn-planted cane see *H.A.*, 28: 1934.]—Begg, Sutherland and Co., Marhowrah, Bihar.

3126. GLASZIOU, K. T.
The physiology of sugar-cane. I. Studies on the nutritional and physiological interrelationships of the germinating cutting.
Aust. J. biol. Sci., 1958, **11**: 16-29, bibl. 18.

A study was made of the ability of the sett to support the growth of the young shoot in the absence of any other source of nutrient and without photosynthesis. Changes in moisture content, fresh and dry weights, carbohydrate contents, and N and P fractions are described. In the new shoot dry weight increased in an approximately linear manner over a 4-week period, indicating that growth was not limited by a diminishing supply of metabolites moving from the cutting. Extrapolation of the curves for sugar contents showed that the concentrations in the shoot and in the cutting would have been the same at about 40 days from planting. The results indicated that the transport of sugars from the cutting was limited by a first-order chemical reaction and not by simple diffusion. Water movement and hormone relationships during germination and growth are also discussed.—Bot. School, Univ. Sydney.

3127. MEGURO, M., AND FERRI, M. G.
Economia d'água de cana de açúcar. **(The water balance of sugar cane.)** [English summary ½ p.]
An. Acad. bras. Cienc., 1956, **28**: 523-43, bibl. 13, illus., [received 1958].

Transpiration and evaporation measurements and studies on stomatal movement were made in the laboratory and in fields of 1-year-old plant cane of the variety Co.290. Daily transpiration curves showed that there was no restriction on water consumption during the test days (at the end of the rainy season), and there was no closure of stomata during the day time. The amount of water transpired was calculated to be 13,365,400 litres per ha. per year, which is equivalent to 1,336 mm. of rainfall. This is approximately equal to the average yearly rainfall for the district (1,401·6 mm.).—Univ. São Paulo, Brazil.

3128. DU TOIT, J. L.
Sucrose formation and concentration in sugarcane.
Bull. S. Afr. Sugar Ass. Exp. Stat. **6**, printed in *S. Afr. Sugar J.*, 1958, **42**: 205-13.

In the past two seasons low sucrose contents in the Natal crop have caused considerable concern. Certain factors which affect sucrose formation and concentration are discussed. Records kept since 1928 show that weather conditions (rainfall and sunshine combined) during March to June is the main factor determining the sucrose content in the subsequent crushing season. The correlation is highest (R=0·801) for cane harvested in the early part of the season, especially in July and August. In later months the correlation, though still highly significant, is lower, because climatic conditions during the harvest period can have a modifying influence.

3129. HALLIDAY, D. J.
The manuring of sugar cane.
Outlook on Agric., 1957, **1**: 223-9, bibl. 42.

Results of the world's fertilizer experiments on sugar cane, summarized in this paper, show that yields can be greatly increased in all countries and on all soil types by applying the right fertilizers in adequate amounts at the right times. Yet dressings are usually much less than the recommended amounts, especially on smallholdings, and there is still need for more research on many aspects of manuring even on progressive estates. [Author's abstract. Readers are also referred to the book with the same title, reviewed in *H.A.*, 27: 965.]

3130. HODNETT, G. E.
The responses of sugar-cane to fertilizers in Barbados and the determination of optimal dressings.
Bull. Dep. Sci. Agric., Barbados, **25**, [1957], pp. 13-19, bibl. 8.

From the results of 54 field experiments conducted since 1928 on 2 main soil types derived from coral limestone, average responses to standard dressings of N, P and K have been estimated. The black soils (low rainfall) have given higher responses to N and lower responses to K than the red (high rainfall) soils. P responses have been small. For all fertilizers ratoons responded more than plant canes. Dressings giving the maximum financial returns are discussed.

3131. GRECINGER, V. H.
Sugarcane in Tadžikistan. [Russian.]
Bjul. Vses. n.-i. In-ta Caja i subtrop. Kul'tur, 1955, No. 4, pp. 123-33, from *Ref. Ž. (Biol.)*, 1957, No. 23, Abstr. 97,497.

In experiments conducted in 1946–1948, the highest yields were obtained from planting in December and February, in rows 1·2–1·4 m. apart. Top dressing with 120 kg. N per ha. gave the highest yield increase of both cane and sugar. F.Y.M. was less effective than a complete fertilizer applied at 90–120 kg. N per ha. Fertilizers were more effective after a preceding crop of sweet potato than after lucerne.

3132. TABAYOYONG, F. T., AND BASILA, F. A.
Variety × fertilizer test (6×6 factorial) Experiment No. 277.
Sugar News, 1957, **33**: 644-50.

Of six varieties tested, C.P.29/116, Co.449 and Co.440 yielded best, but P.O.J.3016 had highest sugar/cane ratio. A 150 : 120 : 240 kg./ha. fertilizer dressing produced the highest yields, with a significant variety × fertilizer interaction. Canes harvested at 12 months old outyielded those harvested at 14 months.

3133. TABAYOYONG, F. T., AND BASILA, F. A.
Quantities and manner of nitrogen application (3 × 4 factorial).
Sugar News, 1958, **34**: 8-11, 13.

Three levels of fertilizer, viz. 120 : 120 : 120, 90 : 120 : 120 and 60 : 120 : 120 kg./ha. of N : P_2O_5 : K_2O, were applied in full at planting time and in 3 different split applications. No significant yield differences were observed, but 90 : 120 : 120 gave the highest and most profitable yield.

3134. JAN, O. [M.].
The yield and quality of sugarcane as affected by the graded and split application of nitrogen.
Agric. Pakist., 1957, **8**: 331-40, bib. 7.

Combinations of 3 total levels of N (100, 125 and 150 lb./acre) and of 4 times of application (at planting and 1½, 3½ and 4½ months later) on 3 plant and 2 ratoon crops showed that yield of cane and sugar increased with increased levels of N, although higher N levels depressed to c.c.s. %. Part application at planting time increased yield in the plant crop. The ratoon crop benefited greatly from an early and heavy dressing. Delaying the last part of the dressing until 4½ months after planting was not beneficial.—Sugarcane Res. Stat., Mardan.

3135. CLEMENTS, H. F.
Recent developments in the crop-logging of sugar cane. Phosphorus and calcium.
Stat. Progr. Note Hawaii agric. Exp. Stat. **114**, 1958, pp. 17, bibl. 6.

Using an Amplified Phosphorus Index, in which the Standard Phosphorus Index (P content of leaf sheaths Nos. 3, 4, 5 and 6 modified for sheath moisture and total sugar levels) is further modified using the P level of a recently matured internode. It was shown that even in P-deficient soils, once the roots are fully developed, there is enough P to support the crop. These data also explained why ratoons normally failed to respond to P. Using a Calcium Index, a marked response of cane to broadcast applications of ground coral was also demonstrated.

3136. BONNET, J. A., AND OTHERS.
Effect of lime and phosphate-bearing materials on sugarcane yields. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1958, **42**: 1-6, bibl. 10.

Superphosphate and hyperphosphate were each applied at 0, 50, 125 and 200 lb. P_2O_5/acre, with and without lime at 4 tons/acre, to sugar cane growing in an acid clay soil. P caused no significant increase, but lime increased yields in both 1st and 2nd ratoons, the total increase being 11·3 tons of cane per acre for the 3 crops.

3137. Coleman, R. E.
The effect of gibberellic acid on the growth of sugar cane.
Sugar J., 1958, **20**(11): 23-6, bibl. 11.

Several experiments were performed to ascertain the effect of gibberellic acid on the growth of sugarcane. In greenhouse tests it was found that seed-piece treatments increased the height of plants 56% for a period up to 23 days. After this period the rate of growth of treated plants appeared to level off while that of control plants continued at the same rate. At harvest 113 days after treatment there were no significant differences in height due to the gibberellic acid treatments. There were, however, significant differences in fresh weight of the plants at harvest, the untreated plants having a greater weight than the treated plants. Repeated foliar application of a 10 p.p.m. gibberellic acid solution applied to plants in the greenhouse produced plants which were 60% taller and with a significantly greater fresh weight than control plants. Experiments in the field with repeated foliar applications of gibberellic acid solutions for a 6-month growth period produced plants 30 inches taller than control plants. However, harvest data indicated that such treatments produced only 10 inches greater length of millable stalks. The gibberellic acid treatments did not affect the ultimate yield of tons of sugarcane per acre, stalk weight or diameter, number of nodes or length of internodes, total solids, sucrose, or juice purity. There was evidence from growth measurements taken throughout the growth period that gibberellic acid had a more pronounced effect upon height of plants when environmental conditions were unfavourable for normal vegetative growth. Growth measurements obtained during the extremely cool conditions of November showed that gibberellic acid treatments increased the height of plants three times that of controls. [Author's summary.]—Agric. Res. Serv., U.S. Dep. Agric.

3138. Antoine, R.
La production de boutures saines dans la lutte contre la maladie du rabougrissement des repousses de la canne à sucre à l'Ile Maurice. **(The production of clean setts in the control of ratoon stunting disease of sugar cane in Mauritius.)**
Rev. agric. sucr. Maurice, 1958, 37: 8-13.

Plans and specifications are given for the construction of a unit for the hot-water treatment of setts which will handle 6,400 tons annually.

3139. Cornuet, P.
Amélioration du rendement de la thermothérapie de la canne à sucre. **(Improving the efficiency of the heat treatment of sugarcane.)**
C.R. Acad. Agric. Fr., 1957, **43**: 925-8, bibl. 2.

In the control of ratoon stunting and chlorotic streak diseases, setts were heated in a solution of 0·005% KCN without serious loss of viability. Optimal temperature and length of treatment depend on variety, but 3 hours between 51° and 53·5° C. is suggested. Treatment with solutions of other chemicals was less effective.

3140. Mathes, R., Charpentier, L. J., and Haley, W. E.
Effect of insecticides applied for control of soil arthropods on yields of sugarcane in Louisiana, 1953-54.
Sugar J., 1958, **20**(8): 22, 31-2.

The symphyllid *Hanseniella unguiculata* and, to a lesser extent, the springtails *Onychiurus armatus* and *Pseudosinella violenta* and a bristletail *Japyx* sp. do considerable damage to cane roots in Louisiana, especially on heavy, poorly drained soils. The effects of soil applications of 12 insecticides on cane yields were compared on 3 soil types. Several compounds gave significant increases in yields in plant cane and in 1st and 2nd ratoons on a heavy soil, the best results being obtained with chlordane at 5 lb./acre and endrin at 1 lb./acre. Responses on lighter soils were less pronounced.—Agric. Res. Serv., U.S.D.A.

3141. Puttarudriah, M., and Usman, S.
Flood causes army-worm outbreak.
Mysore agric. J., 1957, **32**: 124-31, bibl. 8, illus.

An outbreak of *Leucania* (*Cirphis*) *unipuncta* on sugar cane was successfully controlled by either Folidol E.605, 7½ c.c. in 4 gal. water; calcium arsenate, 1 lb. plus 2 lb. lime and 3 lb. jaggery in 30 gal. water; or sodium silicofluoride as a bait with bran and jaggery.

3142. Gupta, B. D., and Avasthy, P. N.
Observations on a new beetle pest of sugarcane crop in Bihar.
Indian Sugar, 1957, **7**: 587-94, bibl. 5, illus.

The life history of *Lachnosterna consanguinea* is fully described. The larvae hibernate and pupate deep in the soil, which hinders control measures. So far no fully effective cultural or chemical control has been devised, but BHC 10% dust at 112 lb./acre gives about 50% control. This may usefully be combined with green manuring.—Indian Inst. Sugarcane Res., Lucknow.

3143. Chapman, L. S.
Spraying BHC for grub control.
Cane Grs' quart. Bull., 1958, **21**: 112-14, illus.

Control of greyback grubs can be more effectively and cheaply achieved by using 2 lb. lindane p.a., applied as a spray suspension at ground level by a specially designed tractor-mounted unit, than by orthodox dusting with crude BHC.

3144. Tabayoyong, F. T., and Basila, F. A.
Insecticide test.
Sugar News, 1958, **34**: 70-3.

Of 3 insecticides tested for control of white grubs (*Leucopholis irrorata*), Penco (12% BHC) at 9 kg./ha. gave the most profitable result, but yields were not significantly higher than those obtained with aldrin 40% w.p. at 5 lb./ha. and with hydrated lime at 2 tons/ha.

3145. Kanoria, T. D., Kothari, S. S., and Sharma, G. D.
A note on the pre-harvest maturity survey conducted at North Bihar Sugar Mills Ltd., Bagaha.
Indian Sugar, 1958, **7**: 653-7, 663, bibl. 1.

By organizing the harvesting of cane fields in order of brix readings determined in a survey made 10–18 days before the crushing season started, a higher recovery rate and greater ease of working at the factory were achieved.

3146. Sharma, S. L., and Prasad, R.
Studies in sampling technique. VI. Rind hardness in sugar cane.
Proc. Indian Acad. Sci. Sect. B, 1957, **46**: 391-402, bibl. 9, illus.

Measurements were taken using a spring-loaded plunger bearing a puncturing point. Five varieties were tested by selecting individual stalks and 3 varieties by sampling all the canes in small plots. The variation due to the various ways of selecting samples is discussed, and levels of accuracy are given for 3 sample sizes selected in 2 ways.—Cent. Sugarcane Res. Stat., Pusa.

Tea.

(*See also* 2976, 3176g, s, 3177c, x, 3178d, f.)

3147. United Planters' Association of Southern India.
Annual Administration Report, United Planters' Association of Southern India, Scientific Department (Tea Section), for 1956-1957 and *Proceedings of the Fifth Annual Conference, 1957*, pp. 1-24 and 25-67.

The report contains information on: *Entomology:* Screening of acaricides for taint, and control of red spider, flushworm, nettlegrub and scale insects. *Chemistry:* Fertilizer trials, including effects of withholding phosphates and the cessation of manuring. *Botany:* Screening of fungicides for taint, blister blight control, foliar application of fertilizers, vegetative propagation and herbicides. The proceedings of the annual conference include: A review of research policy in S. India, notes on the crude fibre content of the tea flush, the laboratory evaluation of fungicides, vegetative propagation, and discussions on numerous tea management problems.

3148. Nyasaland.
Annual Report of the Tea Research Station 1956-57, Mlanje, 1957, pp. 48.

Experimental results here reported include: *Establishing tea:* Close spacing increased the number of casualties. Fertilizer treatments did not affect survival rate provided adequate sulphur was available. *Soil moisture studies:* Pruning conserved moisture and should be done early. A cover crop of *Stylosanthes* competed for soil moisture and adversely affected growth of tea. *Fertilizer experiments:* Ammonium sulphate applications increased tea yield, but no increases were caused by P or K. *Weeds and weeding:* Observations were made on a number of herbicides. *Spacing:* The 4 ft. × (2 ft. × 2 ft.) hedge system outyielded wider spacings. There was no significant interaction between spacing and N dressings. *Permanent shading: Grevillea* and "no-shade" outyielded *Albizzia* and also *Gliricidia*, which had a depressing effect on yield. Shade tended to suppress yield increases due to N. *Vegetative propagation:* Cold frames produced more survivors among cuttings than outside beds. Consolidated ordinary nursery soil proved to be a good medium, if kept moist but not wet. Shade was essential. Cuttings struck best between April and August. Shoots up to 12 months old provided suitable material; single node cuttings were best. *Chemical investigations:* Studies of tea nutrition and fermentation are reported.

3149. Wight, W.
The agrotype concept in tea taxonomy.
Nature, 1958, **181**: 893-5, bibl. 8.

The need is stressed for an efficient method of defining and discriminating between the mixed tea populations in current cultivation. The term "agrotype" is used to connote a population average arrived at by consigning to the individual phenotypes numerical values corresponding to their expression of a typifying feature. It is shown that the frequency with which calcium oxalate crystals occur in the phloem parenchyma of a complete cross-section of the leaf petiole is a valuable criterion for typifying tea populations, and is thus an important method of defining tea agrotypes. There was a positive correlation between crystal frequency and the number of standard shoots that could be obtained by repeated cropping or plucking. There was also a similar and closer relationship between mean crystal frequency of a population and mean surface area of a bush. These observations suggest that crystal frequency may be closely related to a frequency of important genes. Such agrotypes do not bear a simple relation to the vertical types of classical nomenclature. The determination of crystal frequency makes it possible to fix the position of individuals and populations on a scale which has a genetic basis, and thus simplifies the investigation of problems connected with heterogeneous populations.—Tocklai exp. Stat., Cinnamara.

3150. Wight, W.
Agrotype concept in chemical analysis of tea.
Nature, 1958, **181**: 1355, bibl. 4.

Observations suggest that the ratio of chemical elements and compounds to total dry matter of the tea plant may often bear a relation to the agrotypes defined by calcium oxalate crystals and crystal-cells. The K content of agrotypically different tea plants can be correlated with crystal frequency. As the possible crystal frequency is within genetic limits, this suggests that a K content due to treatment could be considered high or low only by reference to the mean K content of the group. The simple genetic behaviour of crystal-cell frequency makes it convenient to regard chemical composition as primarily dependent upon this cell frequency, and to be secondarily influenced by environment. Observations of crystal and crystal-cell frequency could therefore lead to a better understanding of chemical analysis. K has been used as an example, but similar arguments are likely to apply to Ca or to compounds such as rhamnodiglucosides of quercetrin and kaempferol, or to the subjective attributes of flavour and quality of the made tea.—Tocklai exp. Stat., Cinnamara.

3151. Matinjan, A. B.
Selection of the tea plant in the U.S.S.R. [Russian.]
Priroda, 1958, **47**(1): 104-8, illus.

A brief description is given of the development of tea growing in the U.S.S.R. and of some newly bred varieties all of which outyield commercial strains. The new varieties comprise 3 groups: (1) southern hybrids with large leaves and high yields producing the best quality tea; (2) hardy, large-leaved hybrids; and (3) very hardy, medium-leaved hybrids for the northern and mountainous tea regions.

3152. D[UTTA], S. K.
Vegetative propagation. Part 1. Treatment of mother bush, making of cuttings and planting.
Ser. Tea Res. Inst. Tocklai **118**, 1957, pp. 8, illus.

Mother bushes should be given N at 80 lb./acre, remain unplucked for about 6 months, and be watered before taking cuttings. These consist of a mature leaf, a dormant axillary bud and 1¼ in. of lower stem. They are raised in shaded nurseries. In Assam mid-April to early May or mid-September to early October are the best times for taking cuttings.

3153. NAKAYAMA, A., AND HARADA, S.
Studies on varietal differences in the rooting ability of stem cuttings of the tea plant. (Part 3.) The relationship between the weight and the starch content of the stem and root formation. [Japanese, with English summary 9 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 18, pp. 10-12, bibl. 1.

In 21 varieties investigated a significant correlation was observed between the weight of cutting and the weight of roots formed, and for cuttings of equal weight, root weight was correlated with starch content. But starch content was not correlated significantly with rooting ability.

3154. HARADA, S., AND NAKAYAMA, A.
The effect of the oxygen content of the soil on the growth of the tea plant. (Part 1.) Its effect on root formation and root development in tea cuttings. [Japanese, with English summary 9 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 18, pp. 13-16, bibl. 6, illus.

Cuttings were supplied with air containing 5, 8, 14 and 20% oxygen and examined after 24, 34 and 46 days' growth. The less the amount of oxygen supplied, the poorer was the formation and growth of roots.

3155. HARADA, S., AND MITSUI, M.
The effect of soil moisture content upon the growth of the tea plant. [Japanese, with English summary ½ p.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 5, pp. 56-76, bibl. 17, illus.

Young cuttings were grown in 4 different soils. Low soil moisture improved root growth, and high soil moisture increased shoot growth. Injury through excess soil moisture was greatest in sandy soil, in which air retention was least when the plants were submerged. Variety U4 was most tolerant to submersion. This is thought to be due to a low oxygen consumption by its roots.

3156. BUBRJAK, I. I.
The biology of the tea plant in Transcarpathia. [Russian.]
Naučn. zap. Užgorodsk. Un-ta, 1956, **17**: 74-9, from *Ref. Ž.* (*Biol.*), 1957, No. 21, Abstr. 90,338.

As a result of studies conducted in 1950–1953 it was found that tea in the foothill area of Transcarpathia does not enter into a deep winter dormancy. Growth continues until the first autumn frosts, and, if frosty and mild weather alternate, at intervals thereafter. Under fluctuating weather conditions the leaves become very sensitive to frost. When terminal and lateral buds are frost damaged, new growth will develop from adventitious buds, and the ability of the tea bush to recover in this way makes the extension of its cultivation northwards feasible.

3157. DGEBUADZE, N. K.
The effectiveness of different rates of nitrogen on tea plantations under conditions of medium-podzolic soils. [Russian.]
Bjul. Vses. n-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 3, pp. 78-83, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,361.

In Georgia on medium-podzolic soils tea should not be given excessively high rates of N (1,000 kg./ha. or more) as this leads to increased disease incidence, reduced yields, and an increased number of banji shoots. The optimum rate appears to be 300–500 kg./ha. producing 8–9 tons of green leaf per ha.

3158. TALYBOV, N. S.
The influence of different methods of superphosphate application on the growth and development of tea plants in the nursery. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 3, pp. 37-42, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,363.

The best results were obtained when superphosphate, in either powder or granulated form, was placed in the row 5 cm. below the seed at 25 kg. P_2O_5 per ha.

3159. POTAPOV, A. I.
Increasing the fertility of acid soils by chemical amelioration. [Russian.]
Uč. Zap. Mosk. obl. ped. In-t, 1956, **41**: 151-66, from *Ref. Ž.* (*Biol.*), 1957, No. 19, Abstr. 82,364.

In pot experiments with soil from the eastern shores of the Black Sea and in field trials the effect of superphosphate applied at 30 to 3,840 kg./ha. on the growth of tea and some annuals was studied. It was found that high rates improved growth and reduced the amounts of free Al in the soil. Under excessively acid conditions lime should be applied with superphosphate to raise pH to the required level.

3160. KAWAI, S., ISHIGAKI, K., AND TAKAYANAGI, H.
Manurial effect of magnesium in the tea plant. (Part 1.) [Japanese, with English summary ¼ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 18, pp. 61-6, bibl. 17.

In soil culture studies it was observed that Mg increased the growth of the tea plant and reduced its K content. Doubling the K supply decreased the Mg content, but doubling the Ca supply had no such effect. The MgO/K_2O ratio in plant ash and soil was increased by supplying Mg.

3161. Takahashi, T., and Yanase, Y.
A study on flower bud differentiation in the tea plant. (Part 1.) Differentiation stage and habits. [Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 18, pp. 1-9, bibl. 5, illus.

Observations were made on 3 varieties. Terminal and all except the lowest axillary buds could produce flowers, which developed from the 2 outer growing points of each bud, the central growing point remaining vegetative. Differentiation was observable after the 3rd bract had been formed; the speed of flower development depended on temperature and on which of the 4 growth flushes was involved.

3162. Bokučava, M. A., and Soboleva, G. A.
Formation and transformation of organic acids in tea seedlings. [Russian, with English summary 9 lines.]
Fiziol. Rast., 1958, **5**: 70-4, bibl. 18.

In dormant tea seeds malic, oxalic and especially citric acids were present, but on germination there was an abrupt increase in the malic acid content. In 60-day-old seedlings a fresh acid, apparently glyceric acid, appeared in the roots, and quinic acid was found in the stems. In seedlings 100 days old oxalic, citric, malic, quinic and fumaric acids were detected.

3163. Šal'neva, G. A.
Biochemical changes in the tea leaf under conditions in the Krasnodar province. [Russian.]
Bjul. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1956, No. 2, pp. 35-42, bibl. 30, from *Ref. Ž.* (*Biol.*), 1957, No. 20, Abstr. 86,021.

The caffeine, tannin, total N and soluble carbohydrate contents were studied in the leaves of tea grown in different regions of the Krasnodar province. In the more northerly regions tea contained less caffeine, total N and total tannins, the reduction of 1-epigallocatechingallate and 1-epicatechingallate being especially marked. The content of soluble carbohydrates increased, which the author regards as signifying increased frost resistance.

3164. Zaprometov, M. N.
The site of formation of catechins in the tea plant. [Russian, with English summary 10 lines.]
Fiziol. Rast., 1958, **5**: 51-61, bibl. 30.

After exposing tea plants to $C^{14}O_2$ for 92 hours most of the radioactivity (up to 84%) was found in the young shoots and mature leaves. No change in the rate of synthesis of catechins was observed when the roots were excised. Whereas sugars were the main photosynthetic product of mature leaves, catechins as well as sugars were formed by young growing shoots. It is concluded that young, rapidly growing shoots are the main sites of catechin synthesis in the tea plant.

3165. Torii, H., and Ôta, I.
Chemical differences of tea leaves from spring and summer crops. [Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 18, pp. 51-60.

In a comparison between normally plucked tea, tea left unplucked in the previous season and tea sprayed with MH to check flushing in the previous season, the following observations were made. In normally plucked tea, yield and the N content decreased and the tannin content increased from the 1st to the 3rd plucking season. In tea left unplucked in the previous season, the yield and N content were lower, and the tannin content higher, than for normally plucked tea. In tea previously sprayed with MH, the summer N content was less than the spring N content of normally plucked bushes, the N content of the MH-treated bushes having declined during the season when flushing had been checked.

3166. Anon.
Mechanical harvesting of tea.
World Crops, 1958, **10**: 226, illus.

A harvester has been developed in Georgia, U.S.S.R., in which fingers on an arched frame guide the tea tips to three-stage reciprocating blades. Suction from a fan draws the severed tips along ducts to a hopper. Use of this machine has increased yields.

3167. Goodchild, N. A.
Minor pests of tea in Kenya.
Quart. Circ. Tea Res. Inst. E. Africa, 1958, **1**: 44-7.

Cutworms and leaf eating weevils may be controlled by BHC baits, aphids by DDT or BHC sprays, and termites by dieldrin or chlordane.

3168. Osakabe, M.
Study on the control of the tea red spider (*Tetranychus kanzawai* Kishida). (Part 1.) Tests of acaricides and other organic insecticides on the red spider in the laboratory. [Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1958, No. 18, pp. 17-23, bibl. 1.

Among 11 compounds tested against adults and eggs, 12·5% DN-111 emulsion was the most effective. Malathion emulsion and Dipterex gave poor results.

3169. Minamikawa, J., Ueda, K., and Osakabe, M.
Influence of sprays and dusts of insecticides on the tea plant as well as on the qualities of tea. Part 3. [Japanese, with English summary, 1 p.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 5, pp. 77-103, bibl. 4.

Malathion controlled *Euproctis pseudoconspersa*, *Phrixolepia sericea* and *Geisha distinctissima*, but not *Adoxophyes orana*. A 0·1% emulsion applied 30 days before plucking tainted the leaves. Nitran (DN111+rotenone), as a 0·0007% emulsion, controlled red spider but injured the leaves and should be used before the flush. Chlorobenzilate, as 0·017–0·05% emulsions, controlled red spider without damage and caused no tainting when sprayed 9 days before plucking. Neosappiran (Ovotran+Neotran), as a 0·002% emulsion, killed red spider without injuring leaves but, sprayed 19 days before plucking, caused tainting. Pestron (DDT) and Systron (BHC) were unsuitable for tea. Aldrin 0·05% emulsion, sprayed 4 weeks before plucking, caused no injury or taint. Dieldrin and endrin, at 0·036% and 0·039% respectively, controlled *E. pseudoconspersa* and *P. sericea* without damage, but tainted leaves when sprayed 30 days before plucking. A 0·02% emulsion of Albolineum killed mulberry scale larvae without injury but tainted the tea if used 20 days before plucking. [For parts 1 and 2 see *H.A.*, 26: 4245 and 27: 944.]

3170. Saitô, T., Minamikawa, J., and Osakabe, M.
Influence of sprays and dusts of insecticides on the tea plant as well as on the qualities of tea. Part 4. Investigation into residual parathion on tea leaves. [Japanese, with English summary ½ p.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 5, pp. 104-18, bibl. 18.

Parathion decomposed rapidly, 90% being lost 4–5 days after spraying, but animal tests still showed its presence. It is not lost during processing and can be infused in the beverage, although it is undetectable to the taste. Spraying must therefore be done well before plucking.

Sundry crops.

(*See also* 3176a, b, 3177i, w, 3178g, i.)

3171. Puttarudriah, M., and Basavanna, G. P. C.
Preliminary acaricidal tests against the areca mite *Raoiella indica* (Hirst).
Arecanut J., 1958, **8**: 87-8, bibl. 2.

Pestox 3H at 24 c.c. and Systox at 6·5 c.c., both in 2½ gal. water and applied to the soil, and Solbar at 2 oz. and wettable sulphur at ½ oz., both in ½ gal. water and sprayed on the foliage, gave good control.

3172. Baruah, H. K., Raghavan, V., and Murthy, K. N.
Investigations on the utilization of by-products of arecanut (*Areca catechu* Linn.): Part I—Biochemistry of the husk.
J. sci. industr. Res., India, 1957, **16C**: 89-95, bibl. 17.

Changes in the chemical constituents of arecanut husks during development and ripening are tabulated. Experiments in softening the husks and separating the fibres are discussed, and methods of hardboard preparation are described.—Dep. Bot., Gauhati Univ.

3173. Hassan, M. V., and Rao, V. N. M.
Studies on the transplantation of seedlings of cashew (*Anacardium occidentale* Linn.).
Indian J. agric. Sci., 1957, **27**: 177-84, bibl. 4, illus.

In a preliminary trial cashew seedlings, 1 month old, survived satisfactorily when transplanted at different times of the year, provided they were given adequate shade and water. Seedlings that were 2 months old showed lower survival, and thereafter as the seedlings grew older survival percentages declined sharply up to the 7th month. From the 8th to the 12th month, however, there was a marked improvement in survival, which appeared to be associated with the development of lateral roots during that stage of growth. In subsequent trials it was shown that seedlings up to 12 months' old could be transplanted with 80 to 90% success during the summer, provided the tops were headed back to ⅓ or ½ their height. Severing the tap roots 4 to 6 weeks before transplanting did not improve survival.—Cent. Cashewnut Res. Stat., Mangalore.

3174. Smith, F. G.
Beekeeping operations in Tanganyika 1949-1957.
Bee World, 1958, **39**: 29-36, bibl. 12.

Although primarily concerned with bees and their products, this article includes some observations on pollination. In a cashew nut plantation it was observed that trees within 400 ft. of a honeybee colony were fully laden, but that farther away the crop became less. It would also seem that yields of coffee and coconuts may be related to honeybee populations. In recent trials on pyrethrum the yield of pyrethrins was higher in flowers from plants grown in cages containing honeybees than in flowers from plants grown in insect-free cages, the yield in uncaged plots being intermediate.—Beekeeping Div., Forest Dep., Tabora.

3175. Gérin, L.
À propos des chenilles d'*Anaphe venata* Btlr. (Lépid. Thaum.) nuisibles aux colatiers du Cameroun. (**Larvae of *Anaphe venata* injuring kola trees in French Cameroun.**)
J. Agric. trop. Bot. appl., 1957, **4**: 442-5, illus.

A cacao hook is recommended for collecting cocoons, which are burnt. Larvae are most vulnerable to insecticides during the rainy season and become more resistant with age. Spraying or dusting with DDT or BHC containing 8–10% of active material has given variable results, but so far no better control measure has been devised.

Noted.

3176.

a Aiyadurai, S. G., and Koyamu, K.
Variations in seedling trees of cashew.
South Indian Hort., 1957, **5**: 153-7, bibl. 1, illus.
Branching, flowering and fruiting habits found in a population of 1,000 trees.

b Albuquerque, S. D. S., Hassan, M. V., and Shetty, K. R.
How best to raise the cashew.
Indian Fmg, 1958, 7(10): 13-14.
Land preparation, seed selection, planting and costs.

c Anon.
Clones RRIM 600 to 618.
Plant Bull. R.R.I.M., 1958, No. 36, pp. 65-9.
An interim report on performance.

d Anon.
Manuring programme for young replantings.
Plant. Bull. R.R.I.M., 1958, No. 35, pp. 46-8.
Detailed recommendations for young rubber.

e Argoud, S.
Les caroténoïdes des fruits de palme. **(Carotenoids of oil palm fruits.)**
Oléagineux, 1958, **13**: 249-58, bibl. 24.
Comparison of pigments in the varieties *dura nigrescens* and *dura virescens*.

f Barrie, J. W.
Coffee in the highlands.
Papua New Guinea agric. J., 1956, **11**: 1-29, bibl. 3, illus., [received 1958].
A general account of conditions, varieties culture and processing.

g Barua, D. N.
Some physiological effects of environment.
Two and a Bud, 1957, **4**(4): 8-9.
Effects of altitude, shade and soil moisture on tea briefly re-stated.

h Bokučava, M. A., Soboleva, G. A., and Knjazeva, A. M.
Transformation of catechins of tea leaf caused by high temperatures. [Russian, with English summary 4 lines.]
Biohimija, 1958, **23**: 266-8, bibl. 10.
During processing.

i Brantjes, J. M. J.
Bestrijding van draagmieren. **(Control of leaf cutting ants.)** [English summary ⅓ p.]
Surinaam. Landb., 1957, **5**: 203-7.
Aldrin wettable powder (2½%) has given successful control of *Atta* spp. when placed at the entrance to their nests. Costs of large-scale treatment are given.

j Breaux, R. D., Dunckelman, P. H., and Chilton, S. J. P.
The Hawaiian bunch method.
Sugar J., 1958, **20**(8): 4-6, bibl. 3.
For selecting sugar cane seedlings; now under trial in Louisiana.

k Cadillat, R. M.
Le commerce mondial de la banane en 1956. **(World trade in bananas in 1956.)**
Fruits d'Outre Mer, 1958, **13**: 113-31, bibl. 12.

l Cadillat, R. M.
Production et commerce mondial de l'ananas. **(World production and trade in pineapples.)**
Fruits d'Outre Mer, 1958, **13**: 171-4.
Figures for 1954, '55 and '56.

m Carey, D.
Problems and remedies in native copra production.
Papua New Guinea agric. J., 1956, **11**: 30-9, illus., [received 1958].
Including use of an improved kiln, a plan of which is provided.

n Chona, B. L.
Red rot epidemics in India and suggestions for their control.
Indian J. Sugarcane Res., 1958, **2**: 117-24.
A review of progress.

o Christie, G. A.
Q.67—a new variety.
Cane Grs' quart. Bull., 1958, **21**: 118, illus.
High sugar content and resistance to lodging; suitable for good land.

p Davey, J. B.
Cane windbreaks improve quality of papaws.
Qd agric. J., 1958, **84**: 2-6, illus.
Two-row strips of cane reduce defoliation and ripe fruit rots.

q Davis, T. A.
Roots on an internode in sugarcane.
Curr. Sci., 1958, **27**: 145, bibl. 5, illus.
Abnormality observed on stalk of Co.302.

r Dugas, A. L.
The sugar cane borer.
Sugar J., 1958, **20**(8): 18, 21.
Describes a commercial pest control service in Louisiana.

s Dutta, S. K.
Cultural practices in relation to environment.
Two and a Bud, 1957, **4**(4): 10-13.
For tea growing in N.E. India.

t Egan, B. T.
Copper deficiency in the Mossman area.
Cane Grs' quart. Bull., 1958, **21**: 99-100, illus.
Droopy-top disease of sugar cane cured by applying 56 lb. $CuSO_4$ per acre.

u El-Azzouni, M. M., and Salama, S. B.
Studies on the determination of maturity and picking index of the fruits of some varieties of mango.
Bull. Fac. Agric. Cairo Univ., 1956, No. 84, pp. 3-42, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,283.
Physical and chemical tests.

v Farwell, G.
Wealth from cocoa.
World Crops, 1958, **10**: 184-6, illus.
Recent rapid expansion of the industry in New Guinea.

w Freshwater, I. T.
Break pushing machines.
Cane Grs' quart. Bull., 1958, **21**: 76-8, illus.
Tractor mounted arms for forcing paths through sugar cane.

x Gasgoigne, J. A., and others.
Coenzyme A and aldolase in rubber-bearing plants.
Nature, 1958, **181**: 628-9, bibl. 8.
The enzymes involved in rubber synthesis and metabolism in hevea and kok-saghyz.

y Gomes da Silva, J.
O café Mundo Novo. **(Mundo Novo coffee.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(367): 13-19.
Characteristics and certain cultural aspects of this variety (Sumatra × Bourbon).

z Gortner, W. A., Kent, M. J., and Sutherland, G. K.
Ferulic and *p*-coumaric acids in pineapple tissue as modifiers of pineapple indoleacetic acid oxidase.
Nature, 1958, **181**: 630-1, bibl. 7.

3177.

a Grillot, G.
Les essais de canne à sucre au Maroc. **(Sugar cane trials in Morocco.)**
Terre maroc., 1958, **32**: 87-92, bibl. 1.
An outline of the results of variety trials.

b Hamilton, R. A.
Williams Hybrid banana.
Hawaii Fm Sci., 1958, **6**(3): 1-2, illus.
Notes on behaviour of this Cavendish sport in Hawaii.

c Harler, C. R.
The quality of tea. Part I. The liquoring properties of varieties of tea. Part II. Preparation in the major producing areas.
World Crops, 1957, **9**: 482-4, illus., and 1958, **10**: 21-3, 25, illus.
Groups of varieties, jats, clones, etc., and methods of processing.

d Hartley, C. W. S.
Advances in oil palm research in Nigeria in the last twenty-five years.
Emp. J. exp. Agric., 1958, **26**: 136-51, bibl. 30.
Plant production, selection and breeding and improved farming methods surveyed.

e Heikal, H. A.
A study on mango fruit storage. [Arabic.]
Egypt. agric. Res. Rev., 1957, **35**(2): 78-91, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,305.
The effect of storage temperature on fruit quality.

f Heikal, H. A.
A study on mango fruit storage. II. Effect of wrapping the fruits. [Arabic.]
Egypt. agric. Res. Rev., 1957, **35**(3): 62-7, from *Docum. Bull. nat. Res. Centre, Cairo*, 1957, Vol. **3**, Abstr. 101,783.
Various wrapping papers compared for fruits stored at 50° F.

g Instituto Agronômico do Norte, Brazil.
Notas sumárias sôbre a cultura da seringueira na Amazonia. **(Notes summarizing the growing of *Hevea brasiliensis* in the Amazon region.)**
Publ. Serv. Inf. agric., Rio de Janeiro, No. 784, 1954, pp. 28, illus., [received 1958].

h Jain, S. C.
Bagasse—its industrial utilization.
Indian Sugar, 1957, **7**: 598-603, bibl. 4.
For fuel, resin and plastics, activated carbon, alcohol, cattle food, paper and board, and fertilizer.

i Khandige, S. B., Patel, G. I., and Bavappa, K. V. A.
Preliminary observations on the "yellow leaf disease" of arecanut palm.
Arecanut J., 1957, **8**: 61-2.
Caused by mites; trials with acaricides are in progress.

j Ledin, R. B.
Tropical and subtropical fruits in Florida (other than citrus).
Econ. Bot., 1957, **11**: 349-76, bibl. 82, illus.
Descriptions, check list and bibliography of less common species.

k Lodi, G.
Il centro bananiero di Agordat (Eritrea). **(The banana-growing area of Agordat (Eritrea).)**
Riv. Agric. subtrop. trop., 1958, **52**: 81-97, bibl. 7, illus.
Cultural practices, packing, diseases, production and trade.

l McCrae, D. J.
Insect pests and insecticides.
Mon. Bull. Coffee Bd Kenya, 1958, **23**: 68-9.
Tabulated information on coffee pests and suitable insecticides.

m M[yatt], O. W. D.
Stubble shaving on the Herbert River.
Cane Grs' quart. Bull., 1958, **21**: 79-80, illus.
A new implement consists of 2 chain-driven 20-in. cutting discs mounted behind a tractor.

n Narayanan, B. T.
Processing for promotion of quality in coffee.
Indian Coffee, 1958, **22**: 24-9, 31.
Picking, fermentation, washing and grading; a general discussion.

o Nirula, K. K.
Investigations on the pests of coconut palm. Part III. *Nephantis serinopa* Meyrick. Control.
Indian Coconut J., 1956, **9**: 174-99, bibl. 31, [received 1958].
DDT 0·2% spray the most effective material tried [see also *H.A.*, 27: 2994n].

p Nirula, K. K.
Observations on the green muscardine fungus in populations of *Oryctes rhinoceros* L.
J. econ. Ent., 1957, **50**: 767-70, bibl. 20.
Biological control of *O. rhinoceros* with *Metarrhizium anisopliae* suggested [see also *H.A.*, 27: 951h and 2994s].

q Panje, R. R., and Ethirajan, A. S.
Notes on foreign cane varieties.
Indian J. Sugarcane Res., 1958, **2**: 88-93, bibl. 22.
From Canal Point, Everglades and Clewiston in the U.S.A.

r Parreira, P.
Viveiros de café. Formação de mudas e contrôle das pragas. **(Coffee nurseries. Raising of young plants and control of pests.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(368): 18-27, illus.
Direct sowing compared with sowing in seedbeds followed by pricking out into pots.

s Py, C.
La production d'ananas de novembre-décembre. Les problèmes qu'elle pose en Guinée. **(Problems which attend the production of pineapples in November-December in Guinea.)**
Fruits d'Outre Mer, 1958, **13**: 105-10, bibl. 2.
Adequate rainfall or irrigation from March to May necessary for acetylene treatment to be effective.

t Py, C.
L'emballage de l'ananas. **(Packing pineapples.)**
Fruits d'Outre Mer, 1958, **13**: 67-71, illus.
In boxes with paper-covered fibre pads between the fruit.

u Ramakrishnan, T. S.
Shoot rot of young rubber caused by *Phytophthora palmivora* Butl.
Rubb. Bd Bull.,* 1957, **4**: 76-9, bibl. 3.
Cuprosana dust effectively controlled a nursery outbreak.

v Ratkovich, M.
El gusano perforador de la caña de azucar (*Diatraea saccharalis*) en Tucumán. **(The sugar-cane borer (*Diatraea saccharalis*) in Tucumán.)**
Rev. agron. Noroeste argent., 1953, **1**: 7-67, bibl. 117, illus., [received 1958].
A monograph, with special reference to biological control.

w Santini, R., Jr., and Huyke, A.
Identification of the anthocyanin present in the acerola which produces color changes in the juice on pasteurization and canning. [Spanish summary ¼ p.]
J. Agric. Univ. P.R., 1956, **40**: 171-8, bibl. 14, [omitted in error from *H.A.*, Vol. 27, No. 2].
Identified as malvin.

x S[armah], K. C., and G[lover], P. M.
The prevention and cure of red rust.
Ser. Tea Res. Inst. Tocklai **61/2**, 1957, pp. 8.
Caused by the alga *Cephaleuros parasiticus*.

y Satyabalan, K.
A note on the performance of the natural cross dwarf (female) × tall (male) in coconut.
Indian Coconut J., 1956, **9**: 166-73, bibl. 1, illus., [received 1958].
Yields were superior to those of both tall and dwarf varieties.

z Singh, R. N.
Mango breeding.
Hort. Advance, 1957, **1**: 23-33, bibl. 8, illus.
At Saharanpur, with detailed descriptions of 8 hybrids.

3178.

a Spoon, W.
Catongo-cacao uit Brazilië. **(Catongo cacao from Brazil.)** [English summary ¼ p.]
Reprinted from *Cacao, Choc. Suikerw.*, 1957, **25**: 387, as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **262**, 1957, pp. 6, bibl. 7.
The fat content of Catongo beans higher than that of Bahia beans; iodine contents similar.

b Suárez de Castro, F.
Cuando crecen los cafetos? **(When do coffee trees grow?)**
Rev. cafet. Colomb., 1958, **14**(134): 39-42.
Growth-cycle graphs showing the effects of topping and of rainfall.

c Sylvain, P. G.
Progrès techniques en caféiculture. **(Technical advances in coffee growing.)**
Café, Cacao, Thé, 1957, **1**: 111-16, bibl. 36, illus.
A review.

d Ueno, K., and others.
Studies on the improvement of Guri tea for export. Part 2. Trials for improving the manufacturing process. [Japanese, with English summary 1½ pp.]
Bull. Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 5, pp. 1-55, bibl. 11, illus.
Studies on the "irimushi" process, rolling, re-drying and finishing processes.

e U.S. Dep. Agric., Foreign Agricultural Service.
Further increase expected in 1957-58 world coffee production.
Foreign Agric. Circ. U.S. Dep. Agric. **FCOF 1-58**, 1958, pp. 15.
51·3 m. bags estimated for 1957/58 compared with 45·4 m. in 1956/57.

f U.S. Dep. Agric., Foreign Agricultural Service.
Tea: world production and trade.
Foreign Agric. Circ. U.S. Dep. Agric. **FTEA 1-58**, 1958, pp. 17.
The 1958 estimate of 1,612 million lb. is 3% above estimated 1957 production.

g Valsala, P. G.
Pests of arecanut and their control.
Coconut Bull., 1958, **12**: 13-16, illus.

h Vanetti, F.
Ocorrência do membracídeo *Umbonia spinosa* Fabr., em cafèzais sombreados, no município de Ponte Nova. Ensaio preliminar para o seu contrôle. **(Occurrence of the membracid *Umbonia spinosa* in shaded coffee plantations in Ponte Nova municipality. Preliminary control experiment.)**
Rev. Ceres, 1957, **10**: 197-204, bibl. 4, illus.
Dusting with 2% BHC or 3% DDT gave excellent control.

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* Formerly *Indian Rubber Board Bulletin.*

i VARADARAJAN, B. S.
Arecanut research and development in India.
Arecanut J., 1957, **8**: 52-9.
Includes acreage statistics.

j WAALKES, T. P., AND OTHERS.
Serotonin, norepinephrine, and related compounds in bananas.
Science, 1958, **127**: 648-50, bibl. 13.
The presence of large amounts of these amines in bananas is of clinical interest.

k WIJEWANTHA, R. T.
Report on the sulphur-dusting of smallholdings in 1956/57.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **33**: 63-77.
A detailed account of successful co-operation in *Oidium* control.

l WOLFENBARGER, D. O.
Controlling mango insect pests.
Circ. Fla agric. Ext. Serv. **147**, 1956, pp. 14, illus.

NOTES ON BOOKS AND REPORTS.

Books.

(*See also* 3122.)

3179. BENTLEY, M.
Growing Plants without soil (vermiculaponics).
Hydro-Chemical Industries (Pty.), Johannesberg, and Blandford Press, London, 1955, 10½×8 in., pp. 207, bibls, illus., 72s. 6d.

The word "vermiculaponics" in the title of this book is the key to its contents, for Dr. Maxwell Bentley's researches into the use of vermiculite in hydroponics were largely sponsored by the World Vermiculite Company. The deposit of this mica-like ore in South Africa is a rich one and the product has a natural pH very suitable for use as an inert medium for plant growth. After treatment in a furnace, vermiculite becomes aerated, light and absorbent. It is sterile and an excellent insulator, and, judging by the pictures and text of this book, perfectly fills the need for a suitable aggregate in soilless culture.

Hydroponics, using an inert medium in which plant roots grow, is a much simpler and more easily managed system than water culture and, in many places, it is now practised on a large and successful commercial scale. While Dr. Bentley modestly declines to claim that vermiculaponics produces better crops than those grown by orthodox agriculture under perfect conditions, his figures for yields—such as 50½ tons of tomatoes per acre or 41½ tons of potatoes—and the amazing pictures in this book leave the reader in no doubt that hydroponics can be a most desirable supplement to ordinary farming in many places and must form an essential part of any plan to raise the standard of living in certain regions where normal agriculture is difficult or impossible. It is also an admirable and most rewarding hobby for the ordinary householder.

This book is written in an easy, readable style and is free from non-essential technicalities. Yet there is a wealth of information on every aspect of the subject. The author discusses plant nutrients, major and minor, and the effects of deficiencies. He provides nearly 50 formulae for different crops and situations and guides the beginner through the problems of chemical testing, pH control and the use of artificial light. The practical details of tank construction and the management of large and small units are, of course, very fully described and, in Part II of the book, the cultural needs of individual vegetables and flowers are simply and thoroughly covered. There is also a great deal of most useful information on such subjects as raising cuttings, using vermiculite in the summer-house and garden, and for potted plants in the home.

The numerous photographs are a major feature of the book; several are in colour and all show very clearly that the author is an expert, not only at raising magnificent vegetables and flowers by the system of vermiculaponics, but at persuading his readers to "have a go". For anyone interested in soilless culture, whether as a commercial grower of vegetables or flowers or as a householder anxious to reduce his household expenses and enjoy a most fascinating pastime, this book can be unreservedly recommended. G.E.T.

3180. BOHN, R.
Die Technik im Gartenbau. **(Horticultural engineering.)**
Eugen Ulmer, Stuttgart, 1957, 9×6 in., pp. 310, bibl. 95, illus., DM. 16.80.

Books on horticultural machinery are few, and any attempt at guidance through the bewildering array is welcome. In this well-illustrated book, which is one of a series on horticultural subjects, there is a rather natural emphasis on German equipment, and an orientation towards vegetable growing. Glasshouse and frame construction is described and illustrated in detail, with a long section on heating and boilers, including types fired by oil; artificial lighting is not included, and heating by electricity is dismissed as being too dear. In the chapter on watering and irrigation there is a section on water culture by Dr. Penningsfeld, who has included many of the experimental results that he has obtained at Weihenstephan. There are also chapters on tools and machines for soil cultivation and for raising and tending plants, and these are comprehensive and are supported by many pictures and diagrams. Dr. H. Koch has written a section on apparatus used in plant protection. Horticultural engineering is a vast subject for one man to tackle, but in this book the author has assembled a really formidable amount of information, which should be of value, particularly for advisory work. E.N.

3181. BUSVINE, J. R.
A critical review of the techniques for testing insecticides.
Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W.7, 1957, 10½×7 in., pp. 208, bibl. 551, illus., 30s.

Of particular importance in view of the emergence of resistant strains of insect, some being initially resistant, others developing resistance. The essential aim of the author in this review of the literature is to cover adequately such subjects as the physiological standardization of the insects concerned and the various types of test method used.

3182. Buxbaum, F. (translated by V. Higgins).
Cactus culture: based on biology.
Blandford Press, London, 1958, 8½×5½ in.,
pp. 224, illus., 37s. 6d.

Dr. Buxbaum, a taxonomist at the University of Graz, has had 30 years' experience in cactus growing and research. He has a profound understanding of the ecology and environmental needs of the plants, and consequently a strong mistrust of "approved methods" of culture or rigid recipes which can only be applicable under certain environmental conditions. In this book for amateur cactus growers he describes the origin and natural way of growth of the various species, and suggests ways in which the grower can best adapt what facilities he has to create the most favourable conditions. He caters not only for collectors with heated greenhouses or cold frames but also, and with obvious sympathy, for the window-sill grower, and for the beginner as well as the experienced cultivator.

A survey of the geography and climate of cactus countries, illustrated by maps, is followed by chapters on the cultivation of terrestrial and epiphytic types, including their light and moisture requirements, soil mixtures and reaction, nutrition, plant containers (porous pots and those miniature pots which many amateurs find so irresistible are strongly deprecated), and winter quarters. Then follow chapters on seed raising, propagation by cuttings, imported plants (warning beginners of the difficulties of acclimatization), grafting ("hands off grafting unless absolutely necessary!"), pests and diseases, and a calendar of work. In a chapter on the vexed question of taxonomy and nomenclature, the author confesses that botanists are not yet in a position to resolve the confusion in nomenclature and he presents the results of his own work in the form of a provisional classification and observations on phylogenetic trees. Finally there are descriptions of the genera, in alphabetical order, giving their natural habitat, ecological requirements and cultural characteristics.

The book is magnificently illustrated with 12 pages of coloured photographs, 40 of black and white photographs and many line drawings. The coloured plates in particular are works of art, and may convince even those who have always despised cacti as prickly monstrosities that there can be a fascinating beauty about these amazing plants. P.R.-D.

3183. Chandler, W. H.
Evergreen orchards.
Henry Kimpton, London, 2nd edition, 1958,
9×6 in., pp. 535, selected bibl. 1182, illus.,
63s.

The first edition of *Evergreen orchards* appeared in 1950 and was reviewed in *H.A.*, 20: 1156. Since then it must, one imagines, have found its way into most horticultural libraries and onto the bookshelves of many individuals who are interested in the fruit and plantation crops of the tropics and subtropics.

Although this new edition has been thoroughly revised and brought up to date, much of what was said in the original review could be repeated in describing it. The most obvious difference between the two editions is that the general discussion in the first part of the book has been considerably shortened, while that on each of the species has been expanded. A clearer distinction, too, has been made between the dicotyledonous and monocotyledonous species, the two groups being treated in separate sections, each served by introductory notes describing their more important growth characteristics. Two fruits, the passion fruit and the pineapple, that did not appear in the first edition are now included.

Scientific advance is so rapid these days that books of this type, which may be regarded as standard works, need frequent revision and also rapid production. Almost inevitably this allows certain errors to creep in. Thus a perfectly correct comment on the virus diseases of cacao on p. 276 of the first edition has been expanded on p. 393 of the second edition with unfortunate results. There are also certain printer's errors, some inherited from the old edition, others new.

These small defects apart, it is a truly amazing achievement that Professor Chandler, in his retirement, should have been able to revise so thoroughly his *Evergreen orchards* and see it through the press within a year of the appearance of the third edition of his *Deciduous orchards* [reviewed in *H.A.*, 27: 2998]. This new edition, with nearly 500 new, selected references, should be of great interest and value to innumerable people in many lands. G.K.A.

3184. Clifford, D.
Pelargoniums including the popular Geranium.
Blandford Press, London, 1958, 8½×5½ in.,
pp. 299, 42s.

The dream book for the pelargonium fancier, or for any other fancier for that matter, should contain every particle of knowledge about the subject that he can possibly want and be burdened by nothing that he does not want. It should be simple, direct, well arranged, lucid, compendious, a book of encouragement for the beginner and of reference for the advanced. The author, denying the possibility of producing such a work, produces it. Part I deals with cultural procedure and problems in six chapters and provides the encouragement. Part II is for reference. Every Regal or Zonal Pelargonium likely to be found in commerce or in private collections is classified and described so as to render identification possible to all, and probable in the case of readers who have emerged from the fog in which all red geraniums are seen as Paul Crampel and all pink ones as King of Denmark. The species, as distinct from cultivars, are given more technical treatment and 59 are illustrated by photographs, mostly from life. The author has had here to use, as he says, the specialized vocabulary with which the botanical boys have surrounded their mystery, but he has provided a glossary. He has also provided 13 appendices —no less—a bibliography, and, priceless boon in this book, a very complete index. The polished and fluent style, the occasional use of the unexpected word in just the right place, seemed to indicate that here was no stranger to the pen. He proves, in fact, to be both novelist and poet. The Pelargonium Fancy increases daily, the Geranium Society is bulging with members and hungry for more, the partial eclipse of this onetime ubiquitous and to those with memories, nostalgic flower seems over and with other once despised Victoriana it rises from the shades, like Richard to be "more glorious than ever". And to that end this book should help a lot. G.St.C.F.

3185. HALL, C. V.
Horticulture laboratory manual.
Burgess Publ. Co., Minneapolis, Minn., 1957, 10½ × 8½ in., 68 loose-leaf sheets, illus., $2.25.

Designed to give the ordinary *agricultural* student of Kansas an idea of the elements of horticulture and an appreciation of horticulture in everyday life, this work covers in simple language the elementary essentials of horticultural practice applicable to that State. For its purpose it should be extremely useful and worth copying in other regions. For the *horticultural* student it looks rather like chicken feed. D.A.

3186. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.
Directory of the agricultural and animal husbandry research stations in India.
Indian Council of Agricultural Research, New Delhi, 1955, pp. 235, Rs. 1/6.

This directory, made possible by the co-operation of Directors of Agriculture in the different States, contains the names and location of research stations and farms, the crops on which they are working and the general programme of the work.

Although the size of the establishment is not given, the altitude, rainfall and soil types are all indicated. Some 370 centres are recorded in the Agricultural Research section and of these about 87 are concerned in part or wholly with horticultural or plantation crops, including sugar cane. A very large number of the others are also to a slight degree concerned with sugar cane problems.

3187. JONES, E. M.
Outdoor chrysanthemums for garden and exhibition.
Collingridge, London, 1958, 8½ × 5½ in., pp. 117, illus., 18s.

In the many books about chrysanthemums the early-flowering, outdoor types seldom receive more than a brief notice before the writer presses on to deal with the more complicated techniques of growing late-flowering varieties under glass. The Rev. Morley Jones has put that right by producing a book of considerable merit devoted exclusively to the outdoor chrysanthemum for garden decoration or exhibition. Disclaiming any introduction of new and revolutionary ideas, he has aimed at producing a handbook of culture which will provide a solid basis for the beginner and a worthy book of reference for the more experienced. The term outdoor does not imply that the plants should not be afforded occasional protection from the weather, a practice that by some is considered to be unethical. The author with a slightly unclerical forthrightness asserts that a man must be either bone lazy or a fool, if he stands by and allows the work of a year to be ruined in an hour and takes no action to prevent it. As with indoor varieties, particularly for exhibition, much depends on stopping and timing, if first-class blooms are to be ready when needed. The date of stopping, linked with the date of rooting has a marked effect on timing. So too, have inherited characteristics, weather conditions, locality and soil, but these are regarded as being largely outside the sphere of human control. These and other snags, as dealt with most efficiently here, provide a general guide to procedure, ending with a dark hint that despite every precaution no living thing can be trusted always to behave according to rule. It is unnecessary to set out the chapter headings. Enough to say that every stage in the life of a plant from its beginning as a cutting to its end on the rubbish heap or a new start as a stock plant for the next generation is discussed with knowledge and verve. A useful and readable book is the result.

G.St.C.F.

3188. KOTTE, W.
Krankheiten und Schädlinge im Obstbau und ihre Bekämpfung. (Dritte Auflage.)
(Diseases and pests of fruit plants and their control, third edition.)
Paul Parey, Berlin, 1958, 9 × 6 in., pp. 519, illus., 54 DM.

This comprehensive book was originally published in 1940 and has now been revised in the light of recent advances. Certain sections, for example those on nutritional disorders, have been extended and remodelled and new accounts written of diseases and pests which have attained special prominence since the first edition. The arrangement of the material follows a conventional pattern now becoming almost stereotyped for books of this type. Thus diseases and pests common to several crops are first described and this is followed by accounts of more specific disorders arranged under the various crop headings, e.g. apple and pear. The section on each host is preceded by a fairly detailed key to assist in diagnosis. The last part of the book is concerned with what might perhaps be described as the principles of control and includes an account of fungicides, insecticides, spray machinery and methods of application. The author has written the book for grower, adviser and student alike. This is a noble ideal to which others have aspired, and one that is virtually impossible of attainment. However, it is only fair to say that, so far as it is possible to satisfy such diverse interests, the author has succeeded passing well. The book is likely to be most valuable to the student, for whom a bibliography of more than 1,300 references is appended. This same bibliography is notable for excluding, so far as can be seen, all references to work in this country, except that published in the report of one well-known fruit research station.

One of the main impressions of the book is the author's astonishing versatility, for in the interests of unity he has compiled the whole thing himself. There are certain technical deficiencies, e.g. the nomenclature of the bacterial plant pathogens, but in this imperfect world it is obviously unreasonable to expect all things of all men. The book is beautifully produced and profusely illustrated and includes several fine colour plates. J.E.C.

3189. METEOROLOGICAL OFFICE, AIR MINISTRY.
Tables of temperature, relative humidity and precipitation for the world. Part I. North America, Greenland and the North Pacific Ocean, pp. 84, bibl. 39, 8s.

Part IV. Africa, the Atlantic Ocean south of 35° N. and the Indian Ocean, pp. 220, bibl. 213, 20s.
Part V. Asia, pp. 129, bibl. 155, 12s.
Part VI. Australasia and the South Pacific Ocean, pp. 54, bibl. 37, 5s. 6d.
All issued in 1958 and obtainable from H.M.S.O., Kingsway, London, W.C.2.

Information is given in tables of monthly averages and extremes of temperature, of relative humidity with regard to the warmest and coldest times of the day and of rainfall in terms of average monthly and extreme daily totals for 2,000 places all over the world. Parts II and III will deal with Central and South America, the West Indies and Bermuda, and with Europe and the Atlantic Ocean north of 35° N. The whole 6 parts will also be issued as one volume. Maps in each part show the places covered. This publication is of the greatest potential value to those intending to grow crops.

3190. MILSTED, M. F.
Growing African violets in the home.
Collingridge, London, 1958, 8½×5½ in., pp. 80, bibl. in text, illus., 18s.

In North America the saintpaulia or African violet has become the most popular of all house plants, and it was in that part of the world that the author first developed an interest in it. About 10 years ago she returned to England bringing some plants and quite obviously much enthusiasm with her. Since then she and her husband have done much to popularize the saintpaulia in this country, and the plant in its numerous varieties is now a regular feature of the Chelsea Flower Show and indeed of many of the shops which sell pot plants.

There are considerable differences in microclimate between the American and the English home, especially in winter. In most respects the saintpaulia prefers the former, but if it is given a little care it will thrive and flower for many months on end in an English living room. Mrs. Milsted tells us how this can be done without rebuilding the house and then goes on to describe how the grower, by now an enthusiast, can raise more plants by striking leaf cuttings or dividing crowns and even produce new varieties by hybridization. To do all this he or she will almost certainly want to possess, sooner or later, a thermostatically controlled propagator, fluorescent lighting and hydroponic equipment. These and other gadgets, which can be expected to appeal to the mind of modern man, are described with the aid of clear illustrations.

The end of it all, of course, is the "African violet room" (plate 16), with the family and the television presumably occupying less equable quarters elsewhere. In some cases this final stage may be postponed by attacks of one or other of the fairly numerous diseases and pests which attack saintpaulias, but if the control measures described by Mrs. Milsted are followed carefully there is no reason why the postponement should be long.

Finally, 9 species of *Saintpaulia* are described, and brief notes are provided on 50 recommended varieties. There are variations in flower colour and form and in the decorative foliage to suit a wide variety of tastes. All things considered, the saintpaulia seems likely to be a fairly prominent feature of many British homes in the future. G.K.A.

3191. ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION.
Applications of atomic science in agriculture and food, O.E.E.C., Paris, 1958, 9½×6 in., pp. 113, illus., 6s, 6d., $1.25 or 400 fr. (Fr.).

This is the report of a mission to the United States sponsored by the European Productivity Agency of the O.E.E.C. A general report and conclusions are followed by a scientific report which deals in detail with radio-isotopes and their measurement, atomic science in plant and soil research, the use of isotopes in animal science, radiation biology, radiation in food preservation and the training of technical staff.

3192. PALMER, E. F. (VINELAND).
Horticultural Experiment Station and Products Laboratory. The first fifty years, 1906-1956.
Ontario Department of Agriculture, 1958, pp. 76, illus.

This clear account of the activities of this most venerable, but ever lively, fruit research station will give pleasure to those who know it and useful information to others. It is written by its late director who only recently retired after 40 years' service at the station. The records given of some other long-timers would also rival those of any English research station.

Its history is sketched from the time of the original Rittenhouse gift [Lot 1, B. F. & Conc. 1, Township of Clinton] of 90 acres in 1906 to the latest acquisition, the John Boothman farm, Township of Louth, 17 acres in 1953, bringing the area covered up to 234½ acres. Initially in 1906 its activities were "more or less under the direction of a Committee of the Ontario Fruit Growers' Association". In 1908 it passed under the aegis of the newly-formed Fruit Branch, where it remained until 1945. In that year it became a separate branch of the Department of Agriculture of Ontario and there it remains. Famous far beyond the Niagara Peninsula, Ontario, Canada and the States its activities have contributed to the enlightenment of horticulturists all over the world who have profited from its V series of cherries, peaches, grapes, raspberries and strawberries, even vegetables.

It has taken on all problems of cultivation, it has studied storage, canning and marketing problems and the use of surplus products. It has links with other important research and educational centres. Its publications, here set out, are numerous and always worth while.

The report apart from its down to earth, but never dull, narrative of scientific progress contains one or two charming incidentals, to wit, a wage account of 1907 for English and Italian labourers, which seems to indicate two things, that Italian labourers were a good proposition and that two of them at least were literate, and again the delightfully human fact that the annual report for one particular year seems to have never existed or to have been sublimated in some manner beyond mortal ken. What fun and games for librarians and bureaucrats trying to trace same, but now at last they know!

We cannot do less than wish Vineland another equally illustrious 50 years. D.A.

3193. Pape, H.
Leitfaden des Pflanzenschutzes im Zierpflanzenbau. **(Manual of plant protection for ornamentals.)**
Paul Parey, Berlin and Hamburg, 1958, 8½ × 5½ in., pp. 132, illus., DM. 9.80.

In his introduction the author explains that this small book is intended to provide the practical nurseryman with a guide to methods, materials and apparatus recommended for use in the protection of ornamental plants. Early in the book the importance of prevention rather than cure is emphasized, and this leads naturally to a section on the disinfection of apparatus, soil and plant material. Spray dust and fumigant materials are classified and their use briefly described, and this is followed by a general section on common pests and diseases. More than half the book consists of an alphabetical list of ornamental plants, with specific pests and their control. The information provided is clear, and, although more illustrations would have been helpful, the book should prove of value to the nurseryman seeking for succinct and unbiased information on pest and disease control.
E.N.

3194. Perkow, W.
Die Insektizide. **(Insecticides.)**
Dr. Alfred Hüthig Verlag, Heidelberg, 1956, 9 × 6 in., pp. 384, bibls, illus., DM. 28.

This appears to be the first book in German published in recent years on pesticides. It is well organized and is certainly superior to some of the books on this subject published in other countries. It falls into four parts, of which part three is by far the largest (almost 300 pp.) and deals with botanicals, inorganic insecticides, chlorinated hydrocarbons, organophosphorus compounds, and other groups of insecticide. This last class is very diverse and most of the groups, e.g. acaricides, need much more thorough treatment to do them justice. In fact, the chief criticism of the book is the lack of balance caused by this; it has to be admitted, of course, that chlorinated hydrocarbons and, more recently, organophosphorus compounds have become dominant, and energetic competition is going on among rival manufacturers even where the former have been well-established for some time.

The first part deals with general questions of mammalian toxicity, effects on beneficial insects and the difficult problem of induced resistance to insecticides; it also contains the official German regulations governing the sale and use of insecticides issued up to August, 1956. The formulation of insecticides is dealt with in the second part, and the last part includes a glossary, a list of German-Latin names of insects, and a short list of books and reviews published either in Germany or in North America.

The information given is, in general, reliable. England is wrongly credited with launching the acaricide "Dimite" on the world; the name is obviously American. The illustrations are clear and apposite; the reviewer was encouraged to find that Fig. 1 has an English, and not a German, origin. The reviewer also found that the book is written in a German which is very easy to read. Progress in this field is still rapid and extensive, and doubtless a second edition will be required before long. A.H.M.K.

3195. Riess, E. M.
The garden of chaparral.
Vantage Press, New York, 1958, 8 × 5½ in., pp. 158, illus., $3.00.

To the amateur botanist with an interest in Mexican flora, this lively little book should be a source of pleasure. It describes 99 species of semi-tropical plants which have established themselves in the lower Rio Grande valley, many of them bearing curious names of Mexican-Indian origin, modified by Spanish usage. Each plant is also given its English and its scientific name and its uses are noted. The descriptions are frequently enlivened by brief anecdotes or quotations. The artist-author has supplied a vigorous pen drawing for each plant described. These drawings are full of character, but the professional botanist will not find such details as leaf veins, stipules and nodes drawn with any attempt at accuracy, in fact many a leaf or lateral shoot appears to be in the act of setting off under rocket propulsion from the parent stem. The said botanist will also probably object to reading *Pyra Cantha*, to finding the ballmoss referred to as *Epiphyte recurvata* and erroneously pushed into the orchid family, *Amaryllis* and *Polianthes* placed in the lily family, *Croton* in the figwort family and pomegranate in the holly family. The book also contains a sprinkling of mis-spelt words. One can envisage a possible second edition, improved in accuracy and including coloured plates, attracting considerable interest. K.C.

3196. Rochac, A.
Diccionario del café. **(Encyclopedia of coffee terms.)**
Fedecame (Federación cafetalera de América), San Salvador, El Salvador, 1955, pp. 184.

This comprehensive publication has been compiled for the Spanish-speaking coffee growers and traders of South America. Its contents are arranged alphabetically and include geographical names (in some instances with extensive notes on the countries or regions concerned); commercial terms, mainly Spanish and English; weights, measures and currency units; sections of considerable length on the major aspects of coffee growing and marketing, such as grading, diseases, drying, soils, etc. A few Portuguese, French, Italian and German terms are included and an occasional legal expression in Latin. The placing of some sections seems a little illogical, for instance, a great deal of information appears under *Coffee grading*, while *Grading* is defined in one sentence with no cross reference to the more important entry, and statistics on world consumption, instead of appearing under *Consumo* (which is merely a cross reference) are given under *Uso mundial*. In spite of such small inconveniences, the book is a veritable mine of information, and must be unique in coffee literature. If it could have included a much larger collection of Portuguese terms, its considerable value would have been greatly enhanced, but perhaps the Brazilians will produce a counterpart. K.C.

3197. Ruhland, W., and others (Editors).
Handbuch der Pflanzenphysiologie. Band VI. Aufbau, Speicherung, Mobilisierung und Umbildung der Kohlenhydrate. Band IX. Der Stoffwechsel der schwefel- und phosphorhaltigen Verbindungen. **(Encyclopedia of plant physiology. Vol. 6. Formation, storage, mobilization and transformation of carbohydrates. Vol. 9. The metabolism of sulphur and phosphorus compounds.)**
Springer-Verlag, Berlin, Göttingen and Heidelberg, 1958, 10×6½ in., pp. 1444, bibls, illus., DM. 268, and pp. 306, bibls, illus., DM. 88.

In Vol. 6 the many sections include: (1) Ascorbic acid and factors affecting its accumulation in plants (by B. Åberg); (2) Carbohydrate accumulation in fruits and seeds (by E. V. Miller); and (3) Carbohydrate metabolism in storage organs after completion of accumulation; storage and cold storage (in German, by J. Wolf). In Vol. 9 M. D. Thomas's contribution on sulphur nutrition includes references to S deficiency in tomato and black mustard and S accumulation in parts of tomato plants. A. Kjær writes (in English) on secondary organic S compounds in plants and includes data on garlic oil in *Allium* spp. and complex S compounds, especially mustard oils, in cruciferous plants. [For vols. 1, 2, 3 and 7 see *H.A.*, 27: 975 and 4008.]

3198. Ruhland, W., and others (Editors).
Handbuch der Pflanzenphysiologie. Band VIII. Der Stickstoffumsatz. **(Encyclopedia of plant physiology. Vol. 8. Nitrogen metabolism.)**
Springer-Verlag, Berlin, Göttingen and Heidelberg, 1958, 10×6½ in., pp. xxi+1,310 bibls, DM. 286.

This large volume maintains the high scholarly standard of previous members of the series. The articles, 23 in German, 19 in English and 1 in French, are naturally biochemical. Those which will specifically interest horticultural research workers include the following series by H. S. McKee—Nitrogen metabolism of seedlings. Nitrogen metabolism in leaves. Protein metabolism in flowers. Protein metabolism in vegetative storage organs [one section is on onions]. Protein metabolism in ripening and dormant seeds and fruits. Other articles of more specialized interest are: K. Mothes and A. Romeike, Die Alkaloide, and G. Dillemann, Composées cyanogénétiques.

3199. Steinmetz, E. F.
Codex vegetabilis. **(A multilingual index of drug plants.)**
Steinmetz, Keizersgracht 347, Amsterdam, 2nd edition 1957, 11×8½ in., entries 1,216, plus appendices 10 pp. £5 12s. 6d., $15.75, or Glds 60 [+15% for post publication order].

This monument of patience compiled for the benefit of physicians, botanists, herbalists, chemists, druggists, students and others contains 4 parts. In the first appear the botanical names of 1,216 plants, placed in alphabetical order, followed in each case by the name of the plant family and then by the corresponding names of the plant in the most important world languages including Japanese, Chinese and Russian, Sanskrit, Malayan and 16 others. This is followed by notes on natural habitat, parts of the plant used [in Latin], constituents and action of the drug concerned [in English]. The second part is an alphabetical index of all the names used in part 1. The third part, in English, German and French only, defines the meaning of terms used in the description of the effects of the drugs. Finally there is a list of the chief importing and exporting firms in the drug trade in North America, Great Britain, Holland, Belgium, Germany, Italy, France and other countries.

The work of consultation is greatly facilitated by the provision of a marker with English, French, Dutch and German keys enabling one to pick out the equivalent wanted in a particular language.

A fascinating compilation of great potential value for medicinal purposes, or as a source of inspiration to crossword composers. [See also a similar work on plant drugs reviewed *H.A.*, 28: 2014.] D.A.

3200. Treiber, E. (Editor).
Die Chemie der Pflanzenzellwand. **(The chemistry of the plant cell wall.)**
Springer-Verlag, Berlin, Göttingen and Heidelberg, 1957, 10 × 6½ in.: pp. xv-511, bibls extensive, figs 249, DM. 98.

The book is divided into two parts. Part 1 deals with the microscopic morphology of woody plants and of some specific plant fibres of industrial importance, such as seed hairs, bark fibres and fibres of monocotyledons. There is an elementary description of plant structure and histogenesis, and a detailed account of the development, microscopic structure and physical properties of cell walls. The first part ends with a short description of the anatomical structure of the wood of different species.

Part II opens with a discussion of the polymeric properties of cellulose, followed by a careful account of fibre structure and its effect on the physical properties of the cell wall. Next comes a brief treatment of hemicelluloses, pectin, plant gums and mucilages and their distribution in the cell walls of different species. In an appendix to the chapter on fibre structure an account is given of some important chemical derivatives of cellulose, e.g. oxycellulose, cellulose esters and their useful technological properties. Finally there is a chapter devoted to a description of the extractives of living and dead tissue and other substances of interest in cell wall chemistry, such as suberin, wax, cutin and that important complex, lignin.

The book is written with the interest of the fibre technologist very much in mind, and it assembles all the chemical and botanical information relevant to the field of fibre technology. Specialists in particular parts of this field would of course need to consult more detailed expositions dealing with their own interests, but the book will serve a most useful purpose in guiding the investigator new to any aspect of the field. There are fourteen specialist contributors and the editor is Erich Treiber of the Central Laboratory, Swedish Cellulose Industry, Stockholm. There are author and subject indexes. The standard of typography and illustration is excellent, and the whole production is of high quality. B.G.M. and A.E.F.

Annuals and reports.

(*See also* 2720, 3147, 3148.)

3201. ALGÉRIE, GOUVERNEMENT GÉNÉRAL.
Rapport du Conseil de l'Expérimentation et des Recherches Agronomiques pour 1955. **(Report of the Council for Experimentation and Agronomic Research for 1955)**, Algiers, 1957, pp. 269.

Experimental work under review includes the following: *Soils:* fertilizer trials with tobacco, date palms and citrus; irrigation of citrus. *Tobacco:* varietal selection. *Vines:* rootstock trials, varietal trials. *Date palms:* fruit thinning, pollination. *Figs:* variety trials, artificial pollination, use of growth substances. *Olives:* variety trials, vegetative propagation, floral biology. *Citrus:* clonal selection, irregular bearing, juice and fruit technology. *Avocadoes:* varietal trials. *Floriculture:* work on amaryllis, arums, freesias, gerberas, gladioli, roses, strelitzia and tulips, and the cold storage of cut flowers. *Vegetables:* variety trials of beans and tomatoes, mushrooms. *Growth substances:* parthenocarpy, fruit fall, herbicides. *Plant pathology:* control of grasshoppers, *Bruchus lentis*, vine downy mildew, *Myeloïs ceratoniae* and *Prays citri*.

3202. ALMINDELIG DANSK GARTNERFORENING. (DANVIG, A. M., AND PEDERSEN, K.)
Årbog for Gartneri 1957. **(Horticultural Yearbook 1957.)**
S. L. Møllers Bogtrykkeri, Copenhagen, 1958, pp. 234, illus., Kr. 5.

The Yearbook follows its customary pattern; a detailed directory and extensive statistics give information on most aspects of Danish horticulture. Accounts of small-scale manurial trials cover the following, among other, crops: celery, onions, carrots and cabbage. Results of variety trials with dahlias, phlox, erigeron and marigold are presented in the ornamental section. Lastly, the 38th Annual Report of the Committee for Vegetable Variety Trials—with a 3-page English summary—deals with autumn-sown cauliflower and 3 types of radish.

3203. CANADA, MINISTER OF AGRICULTURE.
Report of the Minister of Agriculture for Canada for the year ended 31st March, 1957, 1957, pp. 159, 50c.

The report includes work on the following subjects of horticultural interest: *Science Service.* Tobacco: brown root rot caused by nematodes; physiological stem rot caused by soil treatment with aldrin; cutworm control. Carrots: stimulation of flowering by low temperature and photoperiodic treatments. Cauliflower: whiptail. Tomato: anthracnose (*Colletotrichum phomoides*); P and K nutrition. Vegetable seeds: treatment with insecticide-fungicide mixtures. Turnips: brown heart and root fly control by a combined band application of boron and heptachlor. Onion: fly control. Apple: scab, fire blight, crown rot, leaf pucker virus; aphid and red spider control; nematode control by the immersion of nursery stock in water at 115° F. for 30 minutes. Stone fruits: virus diseases. Peach: replanting in soil infested by nematodes (*Pratylenchus penetrans*). Insect pest control on fruit trees. Small fruits: pests and diseases. Blueberries: need of high light intensity; root studies. Weed investigations. Electric hygrometer humidity control adapted for use in regulating the water applied as a mist in open propagating beds. Herbicides: action of CMU as a photosynthetic poison. Fungicide and insecticide studies. *Experimental Farms Service.* Breeding: tomato varieties Scotia, Ken, Manitoba; strawberry variety Agassiz; cranberry variety Beaver. Physiology; control of leaf drop in holly cuttings by 8 applications of 30 p.p.m. naphthaleneacetic acid; plastic roof shelters of polyethylene film over field-grown chrysanthemums to improve quality and yield; peach fruit thinning with alanap. Nutrition: vegetable production on acid peat. Rootstocks: control of tree size in apples by dwarfing rootstocks and heavy pruning; hardy apple stem builders. Storage: plastic chambers for gas storage of apples. Tobacco: relation between composition and quality; field test for nicotine or total alkaloids; strains of cigar tobacco with a low nicotine content; manuring; topping; irrigation. *Production Service.* Plant protection: plant quarantine; fumigation stations.

3204. CAWTHRON INSTITUTE.
Annual Report of the Cawthron Institute 1956-1957, 1957, Nelson, N.Z., pp. 53.

Among the problems studied the following are of horticultural interest: *Hops:* studies on black root-rot, *Tobacco:* Effects of N, P and K fertilizers; urea as a foliar spray; effects of B, Cu, Zn, Mn and Mo; irrigation; effects of spacing on leaf contents of N and reducing sugars; varieties and new hybrids; curing experiments; diseases (*Verticillium* wilt and butt-rot). *Fruit:* mulching and nutrition of raspberries; Mo contents in leaves of apples and small fruits; investigations on bitter pit. *Tomatoes:* differential treatments with fertilizers, water supply and shade under glass. Short signed articles on the effect of hop nutrition on susceptibility to *Phytophthora*, tomato water culture, mulching and N nutrition, and on hop investigations have been abstracted separately. [See also abstracts 27: 1983 and 27: 2643.]

3205. CENTRUM VOOR PLANTENFYSIOLOGISCH ONDERZOEK, WAGENINGEN.
Jaarverslag 1957, Centrum voor Plantenfysiologisch Onderzoek, Wageningen. **(Annual Report 1957 of the Centre for Plant-physiological Studies, Wageningen)**, pp. 12.

The chief projects reported on are: the effect of the physiological and chemical condition of the plant on the uptake of plant protection materials, and relations between scion and rootstock. Studies in the first project include uptake and translocation of insecticides by detached leaves and the internal effects of insecticides. In the second section experiments on the sterile culture of tomato roots and the grafting of flower trusses on to young plants are described.

3206. COMMONWEALTH ECONOMIC COMMITTEE.
Fruit. A review of production and trade relating to fresh, canned and dried fruit, fruit juices and wine.
[*Publ.*] *Commonw. Econ. Cttee*, 1958, pp. 179, H.M.S.O., Lond., 5s.

World production and consumption figures are given for recent years up to 1956 for temperature and tropical fruits and their products. Citrus and dessert apple production again showed increases, which seem likely to continue.

3207. EAST MALLING.
Annual Report East Malling Research Station, 1957, 1958, **A41**, pp. xxv+173, bibls, illus., 17s. 6d. or $2.50 post free.

As in the past most of the papers published in Part II, "Research reports and reviews" are abstracted separately. In addition to these papers there is an account by R. L. Knight and E. Keep (pp. 62–7, bibl. 19) of the policy adopted, and progress so far achieved, in breeding raspberries, black currants and gooseberries; a short description by the same authors (p. 73, bibl. 3) of a red currant sport, which flowers much earlier than any other variety in the East Malling collection; two papers by J. E. Goode and G. C. White (pp. 113-21, bibl. 12, and pp. 155–8), which describe the effects on open plots of 3 soil management treatments, namely cultivation, grass sward and mulching, on soil N, P, K and Mg, aggregate stability and moisture, and discuss the possible influence these effects might have on fruit crops; a note by A. F. Posnette and R. Cropley (pp. 122–3, illus.) describing symptoms of a little cherry disease found in Worcestershire, which resemble those of the serious virus disease called "little cherry" in North America; an account by G. W. F. Sewell and J. F. Wilson (pp. 126-8, bibl. 8) of the discovery that some common weeds in hop gardens are alternate hosts of the "progressive" hop strain of *Verticillium albo-atrum*; and a description by R. C. Muir (pp. 140–7, bibl. 16) of a method of determining orchard populations of the important predator of orchard pests *Blepharidopterus angulatus*. Part IV, "Growers' bulletins" includes an account by A. V. Delap and E. M. Ford (pp. 159–60) of the way in which root spray cultures have assisted studies on the Fe and Mg nutrition of apples; and semi-popular notes by R. V. Harris (pp. 161–3) on progress in research on *Verticillium* wilt and virus diseases of hops, and by H. B. S. Montgomery (pp. 164-9) on progress in research on fruit crops in 1957. "Viruses and virus diseases" is the title of the 10th Amos Memorial Lecture given by F. C. Bawden.

3208. EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.
Report for the year ending 30th September, 1957, pp. 142.

Botany. Brassica club root: Dieldrin dips resulted in the greatest cabbage yields; PCNB was phytotoxic. *Pea seed treatment:* Captan and thiram gave more effective disease control than an organo-mercury compound, although all improved emergence. *Leek smut control:* A ferbam seed treatment gave good results. *Raspberry dieback:* No dieback occurred in Malling Promise plantations where canes had been tied in the autumn, whereas 10·8% of untied canes died. *Chemistry.* Tomato yields in August were higher with normal base fertilizer and top-dressing applications than with potassium sulphate or no base fertilizer. *Entomology.* Chrysanthemum stool miner was controlled by drenching newly set plants with BHC (0·025%), aldrin (0·1%) or dieldrin (0·05%).

3209. HELLYER, A. G. L. (EDITOR).
Amateur Gardening Annual 1958.
Amateur Gardening, Tavistock St., Covent Garden, London, W.C.2, 1958, 10×7½ in., pp. 140, 6s.

In 39 liberally illustrated articles information on many aspects of gardening is presented for amateur gardeners. These include accounts of the relatively new techniques of ring culture and of automatic watering both for greenhouses and for mist propagation.

3210. HORTICULTURAL EDUCATION ASSOCIATION.
Scientific Horticulture 1957-58, Gibbs & Sons, 16 Orange Street, Canterbury, England, Vol. **13**, 1958, 9½×6 in., pp. 99, illus., price 17s. 6d.

It has on occasions been suggested that not enough space is devoted in H.E.A. publications to education. This particular number is largely devoted to its advancement. As regards education itself the first article, "Welsh education takes up the rural challenge", is very much to the point, showing the difficulty inherent in the Welsh scene and the steps which are being taken or are hoped for to meet it. And, secondly, most of the rest of the articles seem to this reviewer at least to be written primarily for the use of one of the men who educate, namely the lecturer. Environment is much to the fore in present-day horticulture and the lecturer will find the following relevant articles here: photoperiodism and the chrysanthemum, photoperiodism and dormancy, growth and development in controlled environments, growth in coloured light, practical plant irradiation. He may also be helped by a general article on viruses and by separate papers on viruses in soft fruits, in top fruits and in flower crops. And finally both the amateur, the instructor and the flower enthusiast cannot fail to be interested in papers on production of chrysanthemums the year round, the ubiquitous plastic and the propagation of plants from leaves. [A leaflet giving further particulars is enclosed.] D.A.

3211. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.
Annual Report of the Indian Council of Agricultural Research for 1954-55, Delhi, 1957, pp. 175, Rs. 4.75 or 7s. 6d.

Items of horticultural interest included in this report concern the following crops: *Mango:* vegetative reproduction and hybridization. *Citrus:* rootstock trials, fertilizer experiments. *Banana:* varietal studies, spacing and management trials. *Annona:* selection and breeding. *Vines:* juice analyses, breeding for mildew resistance, inducing seedlessness. *Papaw:* breeding, papain manufacture studies. *Onion:* manurial and spacing trials. *Pepper:* induced early flowering, wilt studies. *Ginger:* variety trial. *Turmeric:* spacing trial. *Cardamon:* disease survey. *Chillies:* variety trial. *Medicinal plants:* trials of various species, particularly *Rauwolfia serpentina*. Cytological studies, particularly of polyploidy, and weed control experiments are also reported.

3212. I.N.É.A.C.
Rapport annuel pour l'exercise 1956. **(Report of the work of I.N.É.A.C. for 1956.)** *Publ. hors. Sér. Inst. nat. Ét. agron. Congo belge*, Brussels, 1958, pp. 548, 160 fr. belg.

This lengthy report covers the current activities of the many research stations in the Belgian Congo. Horticultural crops which are featured are as follows: *Oil palm:* selection, breeding and cytology, cultivation and manurial trials, germination tests, trials of planting and transplanting methods, rotation with rubber,. pest and disease control, destruction of old stands by poisoning, chemical studies. *Rubber:* trials of selections and clones, cytology and floral biology, planting methods, spacing trials, cultivation and plantation maintenance trials, latex stimulation, disease control. *Coffee* (arabica and robusta): selection and breeding, including interspecific hybridization, cytology and polyploidy studies, cover crops and shade experiments, seedlings versus grafts and cuttings, fertilizer trials and foliar diagnosis of mineral status, pest and disease control. *Cacao:* selection and breeding, incompatibility studies, shade and fertilizer experiments, vegetative reproduction. *Banana:* hybridization, spacing and rotation trials. *Citrus:* selection, hybridization, rejuvenation of clones, spacing and fertilizer experiments, pruning and rootstock studies, disease control. *Tobacco:* variety, manurial, spacing and rotation trials, disease and pest control. *Tea:* selection, fertilizer experiments, shade trees, plucking studies, foliar analysis. *Other crops:* pyrethrum, avocado, mango, pineapple, litchi, strawberry, cinchona and *Aleurites montana.*

3213. MAURITIUS.
Work on the Experimental Stations of the Department of Agriculture in 1956.
Rev. agric. sucr. Maurice, 1958, **37**: 14-27.

Investigational work in progress includes the following: *Citrus:* rootstock trials; experiments with trace elements. *Tobacco:* seedbed techniques, especially pest control; variety trials; use of herbicides; steam curing experiment. *Jute substitutes:* trials with urena, kenaf and roselle. *Beans:* mechanized cultivation. *Other vegetables:* seed production; fertilizer trials.

3214. MISSISSIPPI.
69th Annual Report of the Mississippi Agricultural Experiment Station for the fiscal year ending June 30, 1956, pp. 96, illus.

Certain sections of the report include items of horticultural interest, as follows: *Horticulture Dep.* (*a*) *Vegetables.*—Cucumber varieties are being selected for resistance to downy mildew. Lima bean, french bean and pea varieties have been tested. Collard varieties were tested for yield, and exposure to cold weather caused them to flower prematurely. Cabbages and turnips increased in S content, but not in yield, when S was added to the soil. Tomatoes are being selected for resistance to *Fusarium* wilt and to nematodes; mulching tomatoes with transparent plastic stimulated growth in spring and checked it in summer, but white or black plastic, or sawdust, improved growth and controlled weeds without affecting yield. Vegetable seed viability was prolonged when chemical drying agents were used in storage. (*b*) *Fruits.*—Work is in progress on breeding apples, strawberries and raspberries, on disease control and marketing of peaches, and resistance to fireblight in pears. (*c*) *Ornamentals.*—Poinsettia propagation was equally successful in the open or under glass, and preliminary height control tests were made with growth inhibitors. Hydrangea cuttings rooted in greenhouse flats, refrigerated, potted and forced, produced commercially acceptable plants; September was the latest suitable time for pinching potted hydrangeas. Red Wing azaleas needed 31–34 days' forcing and Coral Bells 4 days less, before sale dates. Geranium propagation was quicker and cheaper using 2¼-in. pots and 2 or more good cuttings per finished pot, than with the standard procedure of propagation and pinching. Nursery plants in 1-gal. cans grew equally well in most light-weight media or in soil, and nutrients were more effective when supplied in small instalments than in bulk. *Plant Pathology and Plant Physiology Deps.*—Captan was the best of many fungicides for controlling bitter rot of apples and canker of camellias. Work is in progress on chrysanthemum root rot, azalea petal blight, rose mildew, black spot and canker, breeding for resistance to *Ascochyta* in peas, to nematodes in capsicums and to pests and diseases in cantaloupes and watermelons. Weeds in sugar cane were best controlled by pre-emergence use of CMU, TCA and dalapon, the last named also showing promise as a post-emergence chemical. Progress is reported in the control of *Myriophyllum brasiliense*, nutgrass and wild onion. *Delta Branch Station.*—Spinach crops were injured by DNBP and CIPC, but excellent promise was shown by the herbicides CDAA (2-chloro-N, N diallylacetamide) and CDEA (2,chloro-N, N diethylacetamide). *North Mississippi Branch Station.*—Varietal tests with castor beans. *South Mississippi Branch Station.*—Yields of tomato varieties were compared. Attempts are being made to breed a late flowering tung. *Truck Crops Branch Station.*—Snap beans responded markedly to liming on acid soils, and the most promising herbicides were CIPC and DNOSBP. For control of early blight of tomatoes, Dithane Z-78 or tribasic copper sulphate were more effective than antibiotics. The P fertilizer requirement for high tomato yields was practically independent of soil P. Cabbages responded equally to nitrate with Na or NH_4 as the cation. The high yielding capsicum varieties Liberty Bell and Yolo Wonder proved fairly resistant to tobacco mosaic virus; their yields were as high with N alone as with NPK, and NH_4 and Na nitrates were equal in effect. The most promising herbicide for this crop was sodium 2,4,5-T. Results are quoted from variety tests on lettuce, and on broccoli, okra and turnips grown for quick freezing.

3215. ONTARIO DEPARTMENT OF AGRICULTURE.
Biennial Report of the Horticultural Experiment Station and Products Laboratory, Ontario Department of Agriculture, Vineland, 1955 and 1956, pp. 117, bibls.

This report includes information on: peach climates in Ontario; the new tomato variety Vinequeen, which is resistant to *Cladosporium fulvum*; breeding of cannery tomatoes with jointless stalks, intense colour, disease resistance and high vitamin C content; improved methods of determining vitamin C; a new lettuce variety named Velvet. Articles on the nutrition of pears and grapes and the pruning of peaches are abstracted in the sections on deciduous fruits and small fruits.

3216. Steinhaus, E. A., and Smith, R. F. (Editors).
Annual Review of Entomology, Vol. 3.
Annual Reviews Inc., Palo Alto, Calif., 1958, pp. 520, bibls.

Among the 23 reviews in this volume are: Resistance of plants to insects, by R. H. Painter (pp. 267–90, bibl. 198); and Biological control of insect pests, by C. P. Clausen (pp. 291–310, bibl. 119).

3217. Tanganyika.
Annual Report of the Department of Agriculture 1955, Parts I and II, 1956, pp. 44 and 96, Sh. 2/50 and Sh. 4/50, and 1956, ***Parts I and II,*** 1957, pp. 57 and 106, Sh. 3/50 and Sh. 10/50.

Parts I are administrative reports and describe the agricultural conditions of the territory. Parts II deal with current research and experimental work in progress. Reports dealing with horticultural investigations include the following: *Cashew:* control of *Helopeltis* sp. and vegetative propagation. *Coconuts:* establishment trials, fertilizer trials, investigation of tapering disease and control of *Pseudotheraptus wayi. Coffee:* cultural experiments including spacing, inter-cropping, mulching and pruning, vegetative propagation, variety trials, fertilizer experiments and pest and disease control. *Kapok:* pest control. *Pyrethrum:* fertilizer trials, micronutrient trials, mulching, spray irrigation and studies on soil types. *Sugar cane:* pest control. *Vegetables* (particularly beans): pest and disease control.

3218. Uganda Protectorate.
Annual Report of the Department of Agriculture for the year ended 31st December, 1955, 1956, pp. 176, illus., 7s., [received 1958].

The report contains references to: *Bananas:* shade, shade and mulch and cover crop studies, Panama disease. *Coffee:* self-incompatibility and its bearing on *C. canephora* breeding, control of leaf rust, control of berry borer, antestia and lace bug. *Sugar cane:* ratoon stunting disease, varietal aspect of length of day. *Tea:* positive responses to Fe but not to Al and K toxicity.

3219. U.S. Department of Agriculture.
Soil, being ***Yearbook of Agriculture 1957,*** Supt. Documents, Washington, D.C., 9 × 5½ in., pp. xiii+784, illus.

Continuing its practice of devoting each yearbook to one aspect of agriculture, the U.S.D.A. has collected in this volume no less than 88 articles on soil. These are arranged in sections under general headings as follows: *Principles*, including fundamentals of physics, chemistry and water relations; *Fertility*, mainly concerned with separate elements; *Practices*, particularly fertilizing and manuring; *Soil care*, control of erosion, salinity, alkalinity, insect pests and diseases. *Moisture*, conservation and irrigation; *Systems*, land use, mapping, surveying, management and economics; *Regions; Special uses*, pasture, fodder and field crops, tobacco, ornamental plants and lawns, vegetables, orchards, forests, shelterbelts and windbreaks. The final article deals with research services. The detailed index is preceded by a useful glossary of soil terms. The articles on gardens and lawns, vegetables and orchards are abstracted in the relevant sections.

3220. Virginia.
Research Report of the Virginia Agricultural Experiment Station for the period July 1, 1953, to June 30, 1957, 1957, pp. 277, illus.

The report contains short signed articles on many agricultural research projects, a number of which are of horticultural interest [see separate abstracts in the sections on deciduous tree fruits, plant protection, vegetables, tobacco and ornamentals].

3221. West of Scotland Agricultural College.
Report of the Work of the College for the year ended 30th September, 1957, 1957, pp. 81.

Brief mention is made of the following studies in progress: breeding tomatoes for resistance to leaf mould; effect of management on tomato yields and returns; variety trials with chrysanthemums; national fruit trials at Auchincruive; variety trials with vegetables; bracken control; and weed control trials with Simazin and erbon.

New periodicals.

(*See also* 2719, 3040.)

3222. Consiglio Nazionale delle Ricerche.
Pubblicazioni del Centro di Studio sul Castagno [*Pubbl. Cent. Stud. Castagno*], No. 1, 1951, pp. 68, bibls, illus.; No. 2, 1955, pp. 166, illus.; No. 3, 1956, pp. 74, bibls, illus.; No. 4, 1958, pp. 175, bibls, illus.; prices L. 1,000, 1,500, 1,000, and 2,000; being a series of occasional supplements to *La Ricerca Scientifica.*

The Centre for the Study of Chestnuts, instituted in January 1951 near the Forestry Experimental Station of Florence, is under the directorship of Prof. A. Pavari. Its publications consist of articles by research workers and other experts on various aspects of chestnut growing, illustrated with very good photographs and drawings, and usually including summaries in French, English and German. Those articles which are of horticultural interest are abstracted or noted separately.

3223. Horticultural Research Institute, Saharanpur.
Horticultural Advance [*Hort. Advance*], 1957, Vol. **1**, 10 × 7½ in., pp. 105, illus., from Horticultural Research Institute, Saharanpur, U.P., India, Rs. 15.00 (abroad) or Rs. 12.00 (inland).

In 1957 the Fruit Research Station at Saharanpur issued its first annual report containing a number of short papers by its research staff [*H.A.*, 28: 2047]. Now, close on the heels of this report—to be exact in December 1957—comes an even more ambitious publication. This first volume of *Horticultural Advance* contains 15 papers, all but one of which are by members of the Saharanpur staff. The majority describe investigations on mangoes and other fruits, and abstracts of them may be found elsewhere in this number of *H.A.*

3224. van der Laan, P. A., and others (Editors). ***Entomologia experimentalis et applicata*** [*Ent. exp. appl.*], 1958, Vol. **1**, No. 1, 9½×6 in., pp. 72, illus., North-Holland Publishing Company, P.O. Box 103, Amsterdam C., Dutch Glds 32.00, 63s. or $8.50 per volume.

Papers published in the first number of this new journal were all read at a symposium on insects and host plants, held at Wageningen in 1957. It is intended, however, that articles in future numbers should cover a wider field. It is hoped that the journal will provide a meeting place for both experimental and applied entomologists and will include studies on the resistance of crop plants to insects, diapause, phenology, biological control and resistance to insecticides. Four numbers will be issued each year, and each volume will contain at least 320 pages.

3225. Staatliche Lehr- und Forschungsanstalt für Gartenbau, Weihenstephan. ***Obst- und gartenbaulicher Beratungs- und Informationsdienst Weihenstephan,*** [*Informationsdienst Weihenstephan*], 1958, No.1, 8×6 in., pp. 16, Staatliche Lehr- und Forschungsanstalt für Gartenbau, Weihenstephan, appearing 12 times per year, DM. 2.40 for 3 parts.

The emphasis in this new collection of references to, and summaries of, horticultural articles is practical, but research results and observations from Weihenstephan are also included. The pages can be easily detached so that references in each section may be kept together throughout the year; an annual index is to be issued.

Noted.

3226.

a Bundesversuchsanstalt für alpenländische Landwirtschaft Gumpenstein.
Bericht über die Arbeitstagung 1956 der "Arbeitsgemeinschaft der Saatzuchtleiter" im Rahmen der "Vereinigung österreichischer Saatgutzüchter". **(Report of the 1956 meeting of the working group of heads of seed production within the association of Austrian seed producers)**, 1956, pp. 211, illus.
Includes papers on pea genetics and bean breeding.

b Canada, National Research Council.
Review of the National Research Council, 1957, being *N.R.C. 4371*, 1957, pp. 289, illus., 75 cents.
The manifold activities of the N.R.C., mainly in 1956, described.

c Cornell.
Seventieth Annual Report of the New York State College of Agriculture at Cornell University and the Cornell University Agricultural Experiment Station, 1956-1957, 1957, pp. 139.
Extension work and lists of research projects.

d Department of Agriculture for Scotland.
Agricultural Statistics, 1956, Scotland, 1958, pp. 95, H.M.S.O., Edinburgh, 6s.

e Fruit and Vegetable Canning and Quick Freezing Research Association.
Annual Report and Accounts 1955-56 **and** ***1956-57,*** Chipping Campden, Glos., both pp. 27.

f Georgia.
Serving Georgia through research, being ***Annual Report of the University of Georgia College of Agriculture Experiment Stations, 1956-57,*** 1958, pp. 51.
Lists of publications, projects and personnel.

g Hong Kong.
Annual Departmental Report by the Director of Agriculture, Fisheries and Forestry, Hong Kong, for 1956-57, pp. 114, illus., $4.

h Kansas.
Eighteenth Biennial Report of the Director, Kansas Agricultural Experiment Station, Manhattan, 1954-1956, 1957, pp. 46.
Lists of projects and publications.

i Macaulay Institute for Soil Research.
Annual Report of the Macaulay Institute for Soil Research for 1956-1957, Craigiebuckler, Aberdeen, pp. 66.

j New South Wales Department of Agriculture.
Tenth Annual Report, Insect Pest Survey for the Year ending 30th June, 1956, Sydney, 1957, pp. 41.
Includes horticultural pests.

k Pennsylvania.
70th Annual Report of the Pennsylvania Agricultural Experiment Station for year ended June 30, 1957 being *Bull. Pa agric. Exp. Stat.* 623, 1957, pp. 24.
Current projects listed.

l Royal Tropical Institute, Amsterdam.
Inlichtingen en Onderzoekingen van de Afdeling Tropische Producten in 1956. **(Information and research in 1956 of the Tropical Products' Department.)** [English summary 10 pp.], 1957, pp. 70, bibls, illus., f. 3.50.
Includes studies on copal, castor seed, rattan cane, oranges, etc.

m SIERRA LEONE.
Report of the Department of Agriculture, 1956, 1958, pp. 31, 3s.

n SOUTH AUSTRALIA.
Annual Report of the Board of Governors, Botanic Garden, Adelaide, 1956-57, 1957, pp. 20, illus.

o STAHL, C.
Beretning fra Statsfrøkontrollen for det 86. arbejdsår fra 1. juli 1956 til 30. juni 1957. **(Eighty-sixth Report of the Danish Seed Testing Station for the year 1st July, 1956, to 30th June, 1957.)** [English summary 3¼ pp.]
Tidsskr. Planteavl., 1958, **61**: 749-822.